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ABSTRACT

This curriculum guide describes a comprehensive program in elementary education for the Northwest Territories of Canada. The basic themes characterizing the curriculum are that it (1) develops from the child's characteristics, (2) teaches English, when it is not the mother tongue, as a second language, (3) reflects the pluralistic cultures of the region on an equal basis, (4) allows students to freely choose their life patterns, (5) regards Basic English as superfluous, (6) allows students to progress at their own rates through the curriculum, (7) does not use standardized tests, (8) uses heterogeneous grouping, (9) emphasizes learning in general more than specific subjects, (10) recognizes that communication is the heart of the curriculum, and (11) keeps accurate records of students' progress. The guide discusses in detail the following curricular components: crosscultural education, art, arts and technologies, health, kindergarten, language arts, mathematics, music, outdoor education, physical education, science, and social studies. An appendix discusses numerous suggested teaching topics and methods. (Author/DI)

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ELEMENTARY EDUCATION IN THE NORTHWEST TERRITORIES

a handbook for curriculum development

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THE PURPOSE OF EDUCATION

The purpose of education is to provide for all people opportunity for maximum development of their aptitudes, skills, and competencies along with an understanding and appreciation of the sum total of human experience. Such development should enable each individual to choose freely between different courses of action in such a manner that he can live a satisfying personal life while discharging his responsibilities as a participating member of a complex society.

TABLE OF CONTENTS

Introduction 3
Cross Cultural Education 6
Art 17
Arts and Technologies 33
Health 47
Kindergarten (Pre-School) 71
Language Arts 79
Mathematics 117
Music 179
Outdoor Education 195
Physical Education 219
Science 231
Social Studies 253
Yellow Pages 273

INTRODUCTION

A number of fundamental considerations provide the rationale for the curriculum development as outlined in this publication. Repeatedly certain themes will appear, not because we favor "dull repetition", but because of their importance to the implementation of effective educational programs. As an example one might consider a statement such as: "Northern education must reflect the needs and aspirations of all children". This is the type of trite guideline that can be quickly absorbed and as quickly ignored if it is not reinforced in the minds of all educators time and time again. For this reason, therefore, explicit and implict principles will reappear consistently throughout the description of curricula areas in the following pages.

In concise fashion the basic themes which characterize Northern curriculum are:

THE CHILD'S CHARACTERISTICS

1. The curriculum supports the point of view that learning experiences are best developed when they are built upon the strengths the child brings with him to the school. The implication is that the teacher will determine the child's strengths prior to developing the learning program. Building upon the strong characteristics of the child the learning program can attempt to build the necessary bridges which lead to development in terms of the weaker characteristics.

LANGUAGE

2. One of the most important strengths the child may bring to the classroom setting is his capability in terms of his mother tongue. In those settlements wherein the mother tongue is the language of common currency the learning program at the kindergarten through grade three levels is to be carried on in the mother tongue with English being introduced gradually, and specifically taught as a second language.

CULTURAL EMPHASIS

3. The pluralistic character of our society implies that our classroom programs must reflect the attributes of the various cultures on an equal basis. There is no hierarchy of cultures to suggest that the non-native cultures are more important, and therefore automatically deserving of greater emphasis. To put it another way, token approaches toward recognizing native cultures whereby fifteen minutes per week are devoted to such things as instruction in syllabics, or Arctic survival skills are foreign to this curriculum. It is incumbent upon educators to ensure that parity reflects the time to be spent on cultural aspects of any program, course offering, or classroom activity.

FREEDOM OF CHOICE

4. Closely related to language and cultural considerations is the principle of free-

dom of choice on the part of the individual student. The school must provide those learning experiences which will afford the child the opportunity to develop the life style that is compatible with his needs and interests. In this respect Northern education must make it possible for the individual to choose among and between such possible life patterns as: the wage-earning economy; trapping, fishing, hunting economy; guaranteed annual income economy, and leisure-oriented social living. The emphasis must be open-ended in that the developing individual is free to make his choice, rather than having his future pre-determined by the educational system.

BEGINNING ENGLISH

5. The organization of school learning experiences is premised on a continuum of thirteen years including kindergarten and the twelve succeeding years. Such "learning by immersion" programs as Basic English and Beginning English are superfluous given the recommended approach to first and second language teaching and instruction.

INDIVIDUAL PROGRESS

6. Rigid confinement of curriculum content to particular grade levels is obsolete. The thirteen year continuum of learning experiences as noted in (5) must be regarded as being fluid in character. The child must have the opportunity to develop at his unique rate of growth and in keeping with his abilities, needs and interests.

HETEROGENEOUS GROUPING

7. The organization of learning material is based on the assumption that there will be no segregation of pupils on a regular basis. There is ample evidence to indicate that homogeneous grouping procedures do affect the expectations that teachers set for particular groups. Moreover, ability grouping procedures tend to deprive the child who is experiencing learning difficulties of the stimulation and motivation that he might be expected to receive from other members of his peer group.

STANDARDIZED TESTS

8. Related to grouping procedures is the problem of standardized tests. No such tests are authorized or recommended for use in the K-6 years at this time simply because there are not valid tests that can be readily administered to non-white, middle-class students. Such tests as have been administered in the past, measure little beyond what is patently obvious, "the child cannot read".

INDIVIDUAL NEEDS AND INTERESTS

9. The various disciplines, as these are elaborated upon herein, should be viewed as aids in the pupil's guest for skills, understanding, emerging attitudes and not as bodies of content to be mastered and regurgitated periodically, or as organizing criteria for such things as timetables, evaluation and, in general,

administrative and teacher convenience. In short, the philosophy of John Holt suggests the ideal that must influence our approach:

> "....the school should be a great smorgasbord of intellectual, artistic, creative and athletic activities, from which each child could take what he wanted and as much as he wanted, or as little." (J. Holt in "How Children Fail", pg. 180)

It must be understood that subject fields and their adjuncts of textbooks and the like are used primarily as resources for knowledge and not as ends in themselves. In this sense, the emphasis is placed on the all embracing nature of the learning experience and not on discrete subject areas.

COMMUNICATION

10. The tie that binds the K-6 curriculum is communication as defined in its broadest context. Conventionally, communication is thought of in terms of the language arts: listening, speaking, reading and writing. This interpretation is too narrow in that it excludes communication via art, music, drama, mathematics science experimentation, physical education, recreation and, indeed, any activity whereby the individual conveys meaning without the necessity of resorting to verbalization. Given the difficulties created by English being the second language of the majority of the students it is emphasized that every possible avenue of communication be explored and utilized. The child who has problems communicating via the spoken and/or written word may find the medium of art to be more compatible with his needs. Pantomime, cuisenaire rods, jigsaw puzzles, creative dance, all are ways and means of communication that have a legitimate place in the classroom. Moreover, there is little reason, save tradition itself, for the continuing emphasis that is placed on the print medium as the one effective communication tool. Certainly, it is apparent that film in its many forms, tape, records, transparencies are often not used to their fullest potential. Developing a curriculum around the common denominator of communication serves to stress repeatedly the need to broaden and deepen our approach to this fundamental thread that is woven throughout the educational fabric.

RECORD KEEPING

11. The type of curriculum as presented makes it mandatory that accurate, detailed records be maintained on the progress of each student. If the child is to have the opportunity to progress at his own rate, in areas of his choosing, then teachers in the successive years of his schooling must have available to them an up-to-date, definitive picture of his strengths and weaknesses if they are to be in a position to provide the quality and quantity of guidance the child requires.

CROSS CULTURAL EDUCATION

What follows is not a definitive listing or elaboration upon cultural variables. However, there are many facets of the cross cultural classroom situation which are readily discernable and which must be taken into consideration by all educators if our schools are to meet effectively the needs of all students. For the sake of clarity, broad categories of certain variables are provided below.

1. THE SCHOOL

"What does it represent in your settlement?"

(a) Traditionally among the Athabaskan and Eskimo people education was an informal concern practiced by the extended family of father, mother, uncles, aunts, and grandparents. Given this concept, "school" can represent an alien element that has been superimposed upon the traditional life patterns of the people.

Conventionally, many people view the school as the formal, basic institution which makes possible up-ward social mobility, economic status - in short, the "good life". This concept is coming under increasing attack as more and more graduates of the "system" realize the short comings in this point of view. Indeed, as people become disenchanted with the realization that the "pot of gold" does not necessarily lie at the end of the educational "rainbow" a severe re-examination of the conventional role of the school can be expected.

Lying somewhere between the traditional and conventional concepts of the "school" is the point of view that the educational benefits commonly ascribed to the school are of less consequence than other auxiliary benefits the school brings to the community as for example, medical care, radio-phone, generator plant, more reliable transportation, etc. Moreover, although the "school" is viewed as being a valuable aspect of settlement life it is not the overwhelming determinant of the quality of life the people wish to preserve. In this sense, the school complements traditional life styles to the best of its capabilities but it does not force its role upon the settlement and [illegible] people.

Undoubtedly, there are variations in the understanding that people have in terms of the concept of "school". The important thing to realize is that education must be sensitive and responsive to the aspirations people have for their school and the quality of education offered to their children.

(b) The motivational forces that often colour much of the activity taking place in a school are essentially middle-class in their derivation. The white, anglo-saxon atmosphere of the average classroom can be very real. Virtues, such as hard work, competition, getting ahead, acquisition of material goods, applying oneself to a task in the hope of future rewards - virtues which are themselves being questioned in today's society - can be ingrained in the Euro-Canadian society. Teachers should guard against unnecessary propagation of such values, many of which can be meaningless in the Athapaskan-Eskimo societies.

The following comparison table, which presents admittedly stereotyped values from each society, may be useful in demonstrating some conflicts which can occur.

EURO-CANADIAN	**ATHAPASKAN-ESKIMO**
Man must harness and cause the forces of nature to work for his benefit.	Nature will provide for man if he will live in harmony with it and obey its laws.
Man lives in the present and uses the present to prepare for improvement in the immediate future.	Life is concerned with the here and now. Accepting nature in its seasons, we shall get through the years, one at a time. If the things I am doing now are good, doing these same things all my life will be good.
All men should strive to climb the ladder of success. In this sense success can be measured by a wide range of superlatives: first, the most, the best, etc.	The influence of the elders is important. Young people lack maturity and experience. A man seeks perfection within himself - not in comparison with others.
Success will come from hard work and will be measured by material possessions, the extent to which one can command others to work for him, etc.	Man should work to satisfy present needs. Accumulating more than one needs is selfish.
People should save for the future: "a penny saved is a penny earned", "take care of the dollars and the pennies will look after themselves."	Share freely what you have. One of the greatest virtues is giving. "He who has plenty while others are in need is shamed."
Life is orderly and regulated by clock times. Punctuality is vital for the operation of organizations in an industrialized economy.	Time is always with us and there is time available to do all things, if not now then later. Of what value is promptness if people are not ready?

Change is progress and progress is essential. Therefore, change is accepted as the norm and man must strive to achieve continuous change.	The old ways may be followed with confidence and respect. Change should be approached cautiously and treated with respect.
There is a scientific explanation for all events and all behaviours.	Folk lore, mythology, the supernatural, magic may be used to provide adequate explanations for some behaviours and events.
It is necessary to be aggressive and competitive in order to attempt to go ahead.	It is preferable to remain submerged within the group until such times as one's specific skills and/or assistance is called for. There is no need to seek overtly to lead or attempt to dominate.
Each individual shapes his own destiny. Self-realization is limited only by individual capacities to excel and achieve.	The group is more important than any individual.

(c) Disciplinary practices can take several forms as for example: raised voice; cuffing the child; using a convenient book to arouse the unwary from suspected apathy and/or lethargy; outright corporal punishment via a strap or ruler; deprivation of rewards. With few exceptions the non-native person accepts any or all of these forms of punishment as quite routine. "It is the way it is done". In the native experience overt signs of anger or frustration, as these are displayed through disciplinary actions, can have little meaning. What may appear to the non-native as being permissiveness on the part of the parents in actuality may be subtle yet effective approach to child rearing based on love and understanding of a deeper quality than is conventionally known in many Euro-Canadian households. Moreover, the fact that the teacher, on occasion, loses his temper, or in the vernacular, "blows his cool", will undoubtedly do little to enhance the image of the foreign teacher in the eyes of a pupil accustomed to gentle reprimands within a family circle characterized by its considerations of his needs.

2. THE CLASSROOM

"What goes on?"

(a) A study of a random assortment of classroom will indicate at least one characteristic that is common to all - the high proportion of time the teacher often spends in talking. Giving directions, providing explanations, offering counsel and, in some cases, an apparently obsessive compulsion to fill the preceived vacuum with words. Silence, from the teacher's viewpoint, can be anything but golden. Contrast this situation with certain cultural characteristics of the majority of Northern students. Initially, it can be assumed that all of the teacher-centered talk is in a foreign language - English, which is confusing, if not outright unintelligible to the child. Even when the child grasps the words and their meaning it is possible that the volume of information he is expected to absorb on a daily basis is inconsistent with how he is informally educated by his parents or extended family relations. Compounding the problem is the fractured approach to learning, whereby the child is expected to switch his attention and intellect from 80 minutes of language to 40 minutes of math to 30 minutes of social studies with little apparent rhyme or reason. It is fair to suggest that this approach to verbalizing and compartmentalizing of learning is confusing for any child, but particularly for those whose orientation toward education is quite different from that of the average middle-class child. Northern classrooms can counteract this situation by emphasizing teacher-student co-operative learning; activity-centered learning and informal small-group interaction for example.

(b) Related to (a) is the evident inconsistency between child-centered education at the K-3 level and the teacher-dominated classroom from Grade Three through the remaining school years. An oversimplification perhaps, but it is observable that a considerable transformation often takes place in education at roughly the end of the third year of a student's schooling. It is as if a curtain was dropped between education as enjoyment and fun, and education as a "work for the night is coming" proposition. Too frequently, the later elementary years become stamped with textbook-workbook ritual and a concurrent noticeable absence of child involvement in the learning process. It is small wonder that for many students education becomes a crashing bore even before he progresses to the junior high level. In such a situation the child can become retiring and withdrawn to the point of "turning off" the entire process. The unsuspecting teacher may come to the conclusion that it is the child's fault. Shyness and apathy are equated with stupidity and one more child "drops out", quite literally. Again, it is pertinent to note that in homes where the purported benefits of education are not indoctrinated and reinforced, the child is likely to opt out of the system as soon as possible. This situation can partially be rectified by extending and emphasizing the creative, enjoyable classroom atmosphere of the primary years throughout all grade levels.

(c) In many classrooms, be they located in the North or the South, there can be almost total emphasis given to the realization of COGNITIVE OBJECTIVES. Such things as: remembering or re-producing something which has been presumably learned, as well as objectives which involve the solving of some intellectual task for which the individual has to determine the essential problem and then re-order given material or combine it with ideas, methods, or procedures previously learned become the almost exclusive focus of attention. Unfortunately, the pursuit of these objectives frequently ignores what can be the most crucial aspect of learning which are those objectives found in the **AFFECTIVE DOMAIN**. In this respect, the **AFFECTIVE OBJECTIVES** as these are expressed through the pupil's interests, attitudes, appreciations, values and emotional sets or biases are of critical importance and must be given prior consideration by the teacher. As is indicated elsewhere in these pages the native student may be placed in a position of considerable stress by a classroom situation that is totally unrelated to his background and experience. If education is to mean something to these pupils then an awareness and understanding of the importance of personal feelings, emotions, attitudes of acceptance and/or rejection must occupy a position of primary importance in the day-to-day functioning of the classroom.

(d) Sensitivity to the nutritional needs of children is an absolute need on the part of all educators. In any classroom, in any school there may well be children who, unbeknown to the teacher have had little or no nourishment prior to their arrival in the classroom. Such situations as these can occur particularly during the cold, dark winter months when the child gets himself ready for school minus breakfast, or food of any kind. Moreover, the problem is compounded in certain instances where the child is put into the position of having to rely on soda pop, chocolate bars and/or potato chips for his noon lunch. The Northern educator cannot ignore the harsh realities of these and similar situations. It is strongly recommended that the teacher work cooperatively with the parents in attempting to resolve problems of this nature. Failing this the school must take the initiative in providing hot lunch programs which will ensure that every child has the necessary quality of nourishment which will permit him the opportunity to learn in a normally acceptable fashion.

> **IF NOTHING ELSE THE SCHOOL HAS THE OBLIGATION TO PROVIDE THE CHILD WITH A WARM, HOSPITABLE ENVIRONMENT, WHEREIN NOURISHMENT FOR MIND AND BODY CAN BE FOUND.**

(e) The involvement of Northern people in the classroom program is a vital necessity. The type of curriculum as outlined herein simply will not be effective without drawing upon the talents of settlement resource people. In a cross cultural setting, co-operative learning situations which involve the fully certificated teacher and the uncertified lay person in a team teaching arrangement can do much to realize the aims and objectives of Northern education.

Such resource people may be volunteers; they may be contract employees; or they may be hired through casual funds. Regardless of the manner of involvement that is appropriate to your needs, the language, cultural, out-door environmental skills, arts and crafts skills that can be brought to bear and included within the regular school program will greatly enhance the overall effectiveness and value of the learning situation.

(f) Related to (e) is the important role of the teaching assistant. A more appropriate description of the assistant's role might be "teacher-interpreter". The implementation of teaching in the mother tongue makes it mandatory that the language competency of the classroom assistant be used to the fullest possible extent. In the first years of a child's schooling there must be a continuous exchange of role responsibilities between the non-native teacher and the assistant. At various times during each day the assistant will provide the instruction based on the guidance of the teacher. The need for cooperative planning of the day's program is self-evident. Moreover, when the teacher is engaged in instruction, the assistant can provide the necessary cultural interpretation to make the program effective.

(g) The classroom environment must reflect the multi-ethnic composition of our society. Furthermore, the classroom walls, bulletin boards and the like should provide stimulation. This implies frequent change of "scenery". Nothing is more deadly than facing Hallowe'en jack-o-lanterns well into the angels and snowflake displays of mid-December. (The one possible exception is no atmosphere at all which sometimes becomes increasingly evident in the higher grade levels.) There have to be creative, thought-provoking displays in all classrooms at all grade levels and these must be something more than a replica of what one would find in Calgary, Toronto, Halifax or southern schools in general. One of the oldest, and yet most frequently ignored, cliches in education has to do with learning progressing from the known to the unknown. Unfortunately, classroom atmosphere frequently takes little notice of this fact and students are expected to relate to zoos, barnyard scenes, suburban living arrangements and the like, that bear little or no relationship to life north of the 60th parallel. Too frequently we expect the child to make mental leaps from the world he knows to the world the southern conditioned teacher takes for granted. Effective displays can help to bridge these gaps.

3. THE HOME

"Have you looked closely at what it is really like?"

(a) A quick tour of any settlement will reveal the disparity in housing conditions between native and non-native residents. Unfortunately, the realities of the situation often fail to influence classroom practice. We educate as if all children started from the same base line and were raring to go at the sound of the bell. Consider carefully the degree of inequality that is prevalent. Take for example the availability of water in your house as opposed to that of your students. It is possible that the water supply in your residence is at least twice as great as that found in an Indian or Eskimo home. Also, it is likely that your home has thermostatically controlled heat that makes it possible for you to get out of bed in the morning in relative comfort. Contrast your situation with that of your students who can be expected, as a matter of course, to arrive at school punctually at the appointed hour when, unbeknown to the teacher, the child arose from his sleep in the sub-zero cold of a typical day. Then there is the matter of privacy. Multi-roomed, multi-purpose dwellings are a convention in middle-class society. It is taken for granted that a child will have a quiet corner or, indeed, a room where he can do homework and/or self study. Contrast this environment with that afforded by typical native housing. Any possibility of a child pursuing book learning in the usual cramped quarters is a pipe dream on the part of the teacher. The list can be extended to include such things as lighting; storage space (in a home with one set of cupboards where does the child store that project you want him to save for future use?), sanitary facilities (can you legitimately expect middle-class standards of cleanliness?) and food storage and preparation facilities. The point is all too clear. Equal educational opportunity is a dangerous myth. The school has to do what it can to compensate for these discrepancies.

(b) Even more obvious, is the housing segregation characteristic of many settlements. The rule-of-thumb appears to be: "the larger the community the more segregated it becomes". School-community interaction becomes exceedingly difficult when the teachers live in one compound and the settlement people live elsewhere. In too many settlements it is possible for the teachers to go back and forth to work each day and literally never set foot in the real community in which they live. This cocoon-like existance only lends substance to the unreality of education. Teachers have to cross the invisible barriers if any sort of dialogue with their community is to be established.

(c) Given the limited living space of the typical Indian - Eskimo house the infant child can grow and develop in a social-milieu substantially different from that of a middle-class-child. In this respect the child may occupy a position of spectator-participant to the adult life style he might be expected to adopt later in life. The importance of extended family relationships and the free-flow of adults within the home environment affords the child the chance to observe and absorb considerable information about his culture and heritage before he begins the formal education process. One can only speculate on the degree of adjustment that must then be made once the individual crosses the threshold into the classroom. Utilizing the mother tongue as the language of instruction and adopting classroom procedures that relate to the home environment can alleviate adjustment problems.

(d) Communication between the school and the home is often mistakenly conducted via letters, memoranda and report cards in a language (English) which is relative foreign to the parental reader. It is wrongly assumed that procedures of this nature which worked well in the South are applicable to the North as well. In many settlements this is not the case. Communication should be: person to person (with an interpreter, if necessary); written in syllabics (as appropriate); or at least in a level of written English that is readily comprehensible. Report cards pose difficult communication problems even under the most ideal circumstances. In most, if not all Northern settlements, a replica of a Southern reporting form is quite useless. In the majority of instances the teachers are well advised to provide oral reports by visiting with the child's parents. (The one notable exception is in the case of hostel residents where a precise written report does have to be used.) By visiting with the parents on their "home ground" you will demonstrate in a practical manner your willingness to take education to the people rather than expecting the people to come always to the school.

4. THE COMMUNITY

"What are the peculiar characteristics?"

(a) A common error is made in attributing to all communities the identical characteristics that have been noted on the basis of one settlement experience. Although similar physical features may be common in terms of buildings, government agencies, churches, etc., it is a fallacy to assume that the people are monolithic in characteristics. Depending upon the ethnic composition there may be important differences between settlements, as for example between Chipewyan and Dogrib; Slavey and Hareskin; Copper and Back River Eskimo; Keewatin and Baffin Eskimo peoples. Frequently, differences are overlooked that can and do cause learning difficulties. A useful indicator as to just how well differences are recognized is to listen for such over-simplifications as "well, they are Indians", "I know Eskimos"; "I teach Indians (Eskimos) or natives". Our schools must reflect the realization that characteristics vary substantially from one group to another.

(b) Outdoor education is gaining in popularity in Canadian education generally. In the Northern context outdoor education affords the opportunity to bring school and community closer together. Not only are there a multitude of possibilities with regard to environmental studies, the ecology, conservation and similar interest areas, but perhaps more importantly, the child's educational program can be broadened to include traditional life skills programs: hunting, fishing, trapping, Arctic survival. The resource personnel needed to effect this type of program can be drawn from the settlement. Obviously, if one is to teach traditional skills the logical choice of instructor is to be found in the community itself.

(c) The importance of family and religious gatherings cannot be overlooked. Depending upon when these are held, the school should do what it can to ensure that the children are able to participate fully in the festivities. The school year must facilitate the wishes of the community in this regard.

(d) Your community may well be over-organized to the point where the people are confused. A multiplicity of governmental and other agencies have managed to transform a relatively simple, straightforward existence into a complex structure that would do justice to a much larger southern urban area. What the school can do to untangle these situations is a moot point. At a mimimum, the school does not have to add to the confusion by encouraging and creating numerous committees, executives and the like. "Keep community-school relationships as informal and direct as possible" would constitute a useful rule-of-thumb.

(e) The working language of the settlement is likely not English. This should be obvious to anyone who is willing to see and listen to the entire community and not confine his attention solely to the minority Euro-Canadian population. In the majority of cases the languages are easily noted and defined: Eskimo and English; Slavey and English; Hareskin and English and similar combinations. In specific cases the classification process is more difficult, particularly in communities such as Fort Smith and Inuvik. In the latter instnace a colloquial language is spoken, locally referred to as "Deltaeese". As this is not a "pure" language, the common mistake may be made that it is therefore unimportant. Enough indisputable evidence based on ghetto languages is now available to support the contention that locally derived languages are important tools of communication and cannot be ignored in the classroom. The language which has common currency in the settlement is the starting point in the introduction of English as a second language. The English tongue does not replace local languages but is added to the language skills already possessed by the child when he commences his formal education.

5. THE INDIVIDUAL CITIZEN

"How well do you know your public?"

A widely used expression on the part of white people when referring to non-white persons is: "How can you expect me to know him? They all look alike to me." Phraseology of this nature is indicative of (a) tendency to take the easy way out; "I live in the North but really am not overly interested in the non-white peoples as such; (b) an inability to recognize that the native individual may have the same problem in establishing your identity. All white people look the same in his eyes and thus the individual identity of the teacher means very little to him.

(b) Part and parcel with (a) can be a reluctance on the part of many non-native people to bother even with a mastery of surnames of community residents. It is rude, not to say shameful, to refer to any person as "Joe and I can't pronounce his last name": Common decency alone suggests that a person's dignity should not be tarnished in this way. Furthermore, the value attached to names by Eskimo people, for example, is very high. A denigration of their names by non-Eskimo people constitutes a serious slight.

6. THE TEXTBOOK

"What are the stereotypes?"

(a) Non-Anglo-Saxon peoples receive inferior treatment in numerous textual materials. Sins of commission are common and readily apparent. The use of "loaded" terminology is a case in point. "Savage", "pagan", "massacre", "red skins", "primitive", are well-known examples. Allied to this problem is the indoctrination of stereotypes. The original Canadians, be they Indians or Eskimo, are dealt with as non-entities and, be it noted, nearly all Canadian historians convey this point to the reader in no uncertain terms. One can only hazard a guess as to the damage that is done in terms of human understanding by placing one race (white) on a pedestal while non-white peoples appear in the pages of Canadian history as so much "comic relief" or as "end-men" on a larger stage dominated by the apostles of "civilization". This is not to suggest that book-burning is the answer to the problem. If all the prejudiced material was to be summarily destroyed there would not be much left. It is to suggest the importance of teacher awareness and discretion in utilizing material of this nature.

Sins of omission are equally common but may be less apparent. A general practice in Canadian historical writing is to ignore native peoples particularly in the post Louis Riel - treaty era down to the present day. In a real sense, once the white man established a foothold throughout the country, the native peoples were "written-out" of the pages of Canadian development. Current developments indicate that this situation is being rectified on the part of publishing firms. However, the social studies teacher, in particular, is obligated to provide the full panorama of native history and not to confine his attention to merely the Jacques Cartier-Samuel de Champlain-Indian wars era. The fact that native traditions and cultures have survived the onslaught of white attempts to assimilate and thereby destroy these cultures surely is indicative of their vibrant qualities. Our social studies programs must give full recognition to the strength those cultures have clearly demonstrated.

SOMETHINGS TO THINK ABOUT

A teacher can do much by listening and trying to understand the context of a question posed by a child. It will be much easier to do this if the teacher knows the child's family and the home environment.

Plowden Report

The assumption is sometimes made that "Northern" children are deprived - therefore it is necessary to get down to business in terms of the 3R's. Otherwise, the child presumably will not catch-up to his imagined counterpart in the South. With undoubtedly the best of intentions the learning program is then laid out as if language arts and mathematics were the be-all and end-all in terms of overcoming the assumed handicap. This is quite wrong. Children throughout the elementary grade levels need time for play and imaginative and expressive work and may suffer later if they do not get it at school. It all comes down to the fact that the child must have ample opportunity to engage in vicarious experiences which will broaden his horizons and enhance his feelings of involvement in what is taking place around him.

Plowden Report

Most children even by the time they first come to school although there is a great deal of their mother tongue which they still have to learn, yet have mastered a rich variety of uses for what they do know. Unless what they are doing in school relates to the uses of language with which they are familiar, and makes sense in terms of what they need language for, it will not carry them far.

"Breakthrough to Literacy"
Longmans, Canada Ltd.

ART

At the outset consider the variety of art forms that are found in Northern settlements. Included are such things as:

Moose Hair Embroidery	
Porcupine Quill Work	
Birch Bark Work	
Bead Work	
Carving	- moose antler caribou antler buffalo horn whale bone soapstone ivory
Tapestry	- seal skin muskrat felt
Leather	- tanning and treatment of hides tooling decorative
Miniatures	- mukluks kamiks kayaks harpoons canoes komatiks
Print Making	- soapstone design colour
Ceramics	- modelling thrown ware mosaics, murals

A number of observations can be made on the basis of the above.

1. A high degree of diversity characterizes the art forms peculiar to individual regions and/or settlements.
2. Many of the artistic expressions have their roots deep in the culture of the people. Other forms are of more recent derivation having been introduced, encouraged and, in instances, exploited by Euro-Canadians.
3. Certain art forms are rapidly disappearing. Moose hair embroidery, as this is practiced by the people of Fort Providence area, and porcupine quill work, are significant cases in point.

4. Given the tenuous state into which certain artistic endeavours have fallen it is important to observe that the arts and crafts of Northern people have proven to be one of the most vital economic assets of the people. Some people may blanch at the thought of construing art in terms of harsh, economic realities. However, in an area where the cash economy is exceptionally fragile it must be recognized that as art forms disappear the economic ramifications are not to be dismissed lightly.

5. Traditional artistic expression in many settlements is the province of the older people. Young practitioners are few in number. Unless current trends are reversed it is safe to predict that in another generation demise of cultural expression through art will be complete.

THE SCHOOL'S RESPONSIBILITIES

The art program has a major obligation in terms of providing the student with the opportunity to explore his own cultural heritage and, in turn, to relate his heritage to those of the larger Canadian and world settings. In this respect, the teacher faces a task of sizeable proportions. Given the background and training of many teachers it is possible to implement an art program that denies the existence of an artistic heritage on the part of the students. In this sense the school art program can become a vehicle for cultural replacement. The impact of Euro-Canadian and/or international art forms can be such as to imply clearly to the student that the culture of his people is not worthy of study, or indeed, consideration.

In the light of the foregoing statements, care must be taken in planning the art curriculum to avoid extremes. A limited exposure to Northern art is mere tokenism. A few carvings in a display case; a local print or two hung in the hallways; extra-curricular Northern art activities provided after "the real thing" has been taught, only serve as indicators that Northern art has a low priority in the overall school program.

On the other hand, an art program soley confined to the Northern context would be an injustice to the child as well. It must be remembered that art crosses cultures just as much as it reflects specific cultures. A unified and balanced art program must be developed and maintained.

It has been recognized that art in its many forms is a significant means of communication. The child's concept of his heritage, his perception of the world as he sees it, and as he thinks it should be, can be conveyed through artistic expression. The fact that the child can have great difficulty in putting his thoughts into English words only serves to underscore the need to encourage children to express themselves in their own way through the art form of their choosing.

If the art program is to be something more than scissors, glue, and tempera paint, then the wisdom and guidance of artists is essential. In most settlements there is a thriving arts and crafts program. The counsel of the carver, the print maker, the leather worker should be sought early in the development of any program. More importantly the in-classroom demonstration and help of local resource personnel will indicate that the school attaches value and importance to the heritage of the people. In this manner, one more link can be established between the school and the home.

However, it must be noted that even with "school" recognition and encouragement dramatic change is not to be expected overnight. Generations of people have been subjected to a point of view that implies that their art has a curiosity value to be equated with "tourist" dollars, but is not of intrinsic worth in itself. It is little wonder therefore, that the adolescent Indian, Eskimo or Metis individual is more likely to turn to "pop" art of the South rather than to exhibit pride in the contributions of his people. Attitudes are changing in this regard, but the school curricula must move quickly in order to assist in averting cultural eradication. Obviously, the obligations of the school to do what it can, when and wherever it can, to give children pride in their heritage, are of more than a little consequence.

The foregoing should make it clear that art in the Northern classroom is viewed as being something other than a "frill" subject. The philosophy implying that "art" is something performed 90 minutes (or some other arbitrary allotment of time) weekly is foreign to this curriculum. Similarly art is not viewed as being the "frosting on the cake": the reward at the end of the day after "reading", "writing" and "arithmetic" have been completed. The value that art has as a communication medium alone, suggests that art can and should be integrated with Social Studies (cultural traditions); Mathematics (shape, design, perspective); Science (colour, form, motion); Language Arts (non-verbal expression) to cite specific examples. Parallel arguments could be advanced to illustrate that art as aesthetic appreciation; art as perceptual awareness; art as manipulative dexterity, all add up to the conclusion of art as being a major element in experiential learning.

AIMS AND OBJECTIVES

A. General

1. To develop pride in, and respect for, the child's cultural heritage.
2. To provide the child with a vehicle for the expression of his ideas through a non-verbal medium.
3. To provide the child with the opportunity to evolve relationships between his culture and the cultures of other peoples.

THE PROGRAM

Five Year Olds

Skill	Activity	Materials	Considerations
Drawing	Disordered scribbling	Large Wax crayons, Chalk, Brushes, Tempera Paint	Stimulation is inherent in the art materials - rhythmic movement, stories, songs. Perceptually, the child can be exposed to linear design in nature and in man-made objects.

Exposure to the art work of his peers as well as the portrayal of art forms in books and periodicals can take place.

Correlate the character of line with play, dancing, and dramatic movement.

Skill	Activity	Materials	Considerations
Painting	Finger Painting Tempera Painting	Finger Paint Tempera paint, Tempera block sponges. Large Bristle Brushes. Twigs and weeds (as available)	Stimulation through rhythmic movements, stories, songs. Observe presence and absence of colour in local environment. Experiment with colour mixtures. Provide opportunity for exposure to painting activites of his peers, pictorial representations of his past, current paintings of his people, as available. Manual dexterity can be developed. Colour Vocabulary is introduced. (What colours are expressed in the mother tongue?)

Skill	Activity	Materials	Considerations
Print Making	Hand printing, Finger dabbing, Mono printing, Gadget printing	Stamp pad, Tempera paint, Liquid starch, Local "found" objects. Finger paint, Large brush, Soapstone (as available)	Introduction to Print Making as this activity is common to such settlements as Holman Island, Baker Lake, Cape Dorset, etc. Local resource personnel can be invited to participate in this activity and to demonstrate their expertise.

Nature of prints can be observed as in animal tracks, foot prints, snowshoe design, snowmobile tread design, stamp cancellations, stamp pad and date stamps, etc.

Classroom print activities can be transferred to outdoor play as with making snow, mud, sand designs.

Skill	Activity	Materials	Considerations
Sculpture	Modelling, Sculpturing, Construction	Plasticine, Flour and Salt, Local clay, Asbestos, Paper and Glue, Cardboard boxes, Egg Cartons, Paper bags, Paper plates, Styrofoam cups	Introduction to Northern expression through stone, antler, wood, ivory, bone carving. Local resource people can be invited to participate in the classroom and to demonstrate their expertise. Through manipulation of materials and forms, develop an understanding of shape, mass, texture, and relationships of volume, space and depth. Vocabulary development in words such as big - little, rough - smooth, round - square, near - far.

Skill	Activity	Materials	Considerations
Fabric and Fabric Decoration	Bead Work, Card Stichery, Simple Weaving	String, Cord Beads, Heavy paper, Fur Samples, Northern hides, Northern cloth material	Introduction to Northern artistic expression through mukluks, Kamiks, parkas head bands, purses, belts, leggings, mittens, etc. Local resource people can be invited to participate in the classroom and to demonstrate their expertise. Manipulation of assorted materials (furs, duffel, calico, grenfell, seal skin, caribou

hide) can help to develop an understanding of textures.

Six And Seven Year Olds

Skill	Activity	Materials	Considerations
Drawing	Experimentation in Symbolism	Crayons, Chalk Brushes Tempera paint	Introduction to symbolism as found in the works of Kalvak, Norval Morriseau (*Windigo*) and the books of George Clutesi (*Potlatch, Son of Raven, Son of Deer*.) Stimulation derived from the stories, songs, pictures, experiences native to the child and his heritage. Field trips provide an opportunity for developing an awareness of differences and descriptive aspects of line as these can be observed in nature. Child can observe linear dimensions of material objects familiar to him. Correlate artistic symbolism they found in poetry, music, cloud formations, drifted snow, arithmetic.

Skill	Activity	Materials	Considerations
Painting	Painting experience with textures, space. Finger painting, Finger dabbing, Spray painting	Finger paint, Tempera mixed, Tempera dry, Tempera block, Brushes, Sponges, Twigs and weeds (as available)	The child communicates his perception of his world. Materials, stories, conversation, poetry, pictures, home, school, settlement activities all provide stimulation. Simple discrimination with regard to colour, texture and shape can be encouraged. Mural work as in Social Studies can be developed.

Colour can be related to natural phenomena such as rainbows, refraction of light by means of a prism, Northern lights, sunsets, sea ice, etc.

Skill	Activity	Materials	Considerations
Print Making	Rubbings Clay printing, Stone printing, Block printing, Mono printing,	Soapstone (as available) Crayons, Coloured chalk, Pencils, Plasticine.	Develop child's awareness of Northern print making processes. Demonstrate examples of Northern prints as found in wall hangings, table napkins and place mats, etc. Observe variation in pattern detail, textures, decorative effect. Acquaint via actual demonstration the many uses of printing. Print making skills can be employed to illustrate other curricula areas.

Skill	Activity	Materials	Considerations
Sculpture	Modelling Sculpturing Construction	Soapstone Bone, Wood, Ivory, Clay, Plasticine, Asbestos, Sawdust, Baloons Plastic, Cord, Local "found" objects.	Provide the opportunity for the child to handle and "get the feel" of assorted Northern art objects. Such factors as weight, volume, smoothness, line and curve, texture can be considered. Visually, the child can become aware of action, animation, expressiveness as these are conveyed by the various forms. The three dimensional characteristics can be explored through tactile and visual awareness.

Models can be constructed for use in social studies, science and mathematics.

Skill	Activity	Materials	Considerations
Fabric and Fabric Decoration	Simple Stitchery, Simple Applique, (glued or stitched), Crayon or chalk on fabric, Cardboard support, Weaving, Bead Work	Beads, Thread, Cord, Scraps of local fabrics, Crayons, Wool, Local hides and fur samples	Develop awareness of skills employed in local fur garment industry. Observe the use of Northern fabrics and fibres. Develop an awareness of the utility, as well as the decorative effect of Northern materials. Provide illustrations of skills characteristics of other peoples and cultures. Relate these skills to puppetry, play house utensils, dolls and play things.

Eight And Nine Year Olds

Skill	Activity	Materials	Considerations
Drawing	Free forms Objects Figures	Crayons, Chalk, Charcoal, Soft Pencils, Plasticine, Fabric, Brushes, Sponges	Refer to art work as found in: Arctic Readers Series (vol. 2 in particular); Tendi, Johnny series; Dogrib Legends. Also note illustrations in Elik for further examples of Northern artistic expression. Personal experiences of the child (life at summer camps; life on the "land") can be developed as can imaginative experiences. Stimulation as derived from listening to folk music (e.g. Buffy Sainte Marie, Canadian Folk Songs) can be encouraged.

Exposure to various artists and their unique styles can take place. (e.g. Group of Seven).

Skill	Activity	Materials	Considerations
Painting	Designs, Pictures, Illustrations, Murals, Finger painting	Tempera mixed and Dry. Tempera Block, Tooth Brushes, Bristle Brushes, Hair Brushes, Sticks, Weeds	Stimulation can be derived from variety of audio-visual sources, field, trips, stories, poetry, legends. Experiment with traditional stories (told by older residents of the settlement) as material around which themes can be developed. Explore the influence of the environment through colour, pattern, texture. Explore the absence of natural referents in the child's environmental experience. (e.g. above the tree line what is the child's perception of "tree"; how is the meaning conveyed?)

Skill	Activity	Materials	Considerations
Print Making	Block Hand printing, Stencilling Soapstone, Ice, Bone	Blocks of Wood, Soapstone, Cardboard, Cork, Fabric, Styrofoam, Ice Blocks, Scraps of hides, Pieces of bone	Manual dexterity combined with physical growth may permit work in heavier local media. Experiment with creating arrangements and patterns. Guidance of local artists, as available, should be sought. Reinforce the child's awareness of quantity and quality of Northern print making activities. Experiment with greeting and seasonal card production

based on themes familiar to the child.

Lettering skills to compliment cards, posters, murals can be developed.

Skill	Activity	Materials	Considerations
Sculpture	Modelling Sculpturing Constructing Manipulative experience with form	Clay Soapstone Papier-mache Cardboard Bone, Wood, Wire, Plaster, Sawdust, Balloons Ice, Snow, Styrofoam	Local resource people can introduce the tools of their art work (e.g. chisels, knives, hammer, saw, wedges, polishing materials, etc.) Actual classroom demonstration and instruction can help to foster familiarity with the skills involved. Emphasis on arrangement and design in third dimension. Design in motion can be developed. Exposure to art forms of other cultures and societies. Relate form, dimension, spatial relationships to mathematics.

Skill	Activity	Materials	Considerations
Fabric and Fabric Decoration	Stitchery, Weaving, Piece work with fur and cloth Decoration with beading, embroidery, fringes, tassels, lacing	Thread, Yarn, Fur odds and ends, Samples of cloth, Beads Twine, Dyes, Wool, Strips of hides	Settlement resource people can provide introduction, demonstration, and instruction with respect to more advanced techniques. Understandings in terms of appropriateness of materials to environmental conditions can be developed. (e.g. types of fur trim on parka hood). Utility and aesthetic considerations can be introduced. Preparation of local materials (skins, hides, pelts) can be demonstrated.

Relate to other Canadian cultures (e.g. French, Ukranian, Danish, Scottish, Micmac, Blackfoot, Haida, Cree, Salish, etc.)

Ten and Eleven Year Olds

Skill	Activity	Materials	Considerations
Drawing	Non-objective and objective: figure, group, gesture, structural drawings	Crayons Chalk, Pencils, Charcoal, Pens, Ink, Paint, Brushes, Fabric, Plasticine	Themes can be developed in terms of the national and international environment. Arrangements, poses, natural groupings can provide source material. Develop concept of line and implied line as these indicate: action, strength, tranquility, power, personality. Use local photographic reproductions to provide stimulation. Exposure to line as found in reproductions of masterpieces can be incorporated. Drawing to be encourage as a part of all curricula areas.

Skill	Activity	Materials	Considerations
Painting	Design and Picture Making	Dry and liquid tempera, Tempera block Water colour, Finger paint, Brushes, Sponges, Sticks	Encourage observations of figure emotions, flora and fauna, landscape, airscape, still life, sports, pastimes, careers. Experiment with effect of darkness of winter and the "midnight sun" on colour and its use. Develop appreciation of expression of N. Morriseau, G. Tailfeathers, N. Colville,

Group of Seven and its adherents, master works of the international art world.

Develop knowledge of colour, shape, texture, role of intensity, detail, perspective, overlapping, light and dark, bright and dull in three dimensional form and depth.

Skill	Activity	Materials	Considerations
Print Making	Soapstone Bone, Wood, Block and Screen, Engraving using local media, wax, clay, plastic	Soapstone Scraps of Bone, Wood Blocks, Linoleum, Ink, Cutting Gouges, Fabric, Squeeze, Stencil paper and knives, Press	Aesthetic and economic aspects of Northern print making can be explored. Differences between originals and copies to be explained. Themes can be developed around myths and legends, people, animals, monograms, architecture, symbolic representation, book-plate designs. Varied media can be manipulated and experimented with in terms of techniques. Knowledge of texture and tone to enrich picture composition can be developed. Introduce variety of print forms (e.g. etching, engraving, lithography, photography, etc.)

Skill	Activity	Materials	Considerations
Sculpture	Modelling Sculpturing Constructing Miniatures	Soapstone Bone, Clay, Vermiculite, Wire, Toothpicks, Scraps of hides, Fur pieces, Metal, Wax, Wood, Roots, Papier-mache, Salt,	Classroom instruction by local artists to be encouraged. Aesthetic and economic aspects of Northern art to be explored. Exposure to master works by Northern artists as these

		Sand, Soap, Simple tools, Bottles, Balloons	are found in G. Swinton's book Eskimo Sculpture, and Nungak's and Arima's book Eskimo Stories (Information Canada) should be encouraged. Themes can include linear sculpture, and construction, free standing and relief sculpture, collage and montage assemblage. Roles and relationships of sculpture and architecture in development of cultures explored. Perceptual development includes: space, mass, texture, tone, balance, basic design vs. applied design.

Skill	Activity	Materials	Considerations
Fabric and Fabric Decoration	Weaving, Basketry, Embroidery, Beading, Tapestry, Tie-and-Dye Twist and Dye, Applique Knitting, Miniatures, Preparation of fur, skins, hides for multiplicity of purposes, Doll making	Bark, Felt Fur, Fabrics, Beads, Thread, Yarn, Artificial fibres, Local dyes, Braid, Cord, Wool, Quills, Moose hair, Claws, Straw or material for doll stuffing, Buttons, Sequins	Classroom instruction by settlement craftsmen is necessary. Aesthetic and economic aspects of Northern work to be explored. Demonstration of variety of Northern crafts that characterize diverse cultures. Relate availability of materials to environmental and conservation considerations, Relate Northern clothing and fabric decoration to other societies.

ADDITIONAL ACTIVITIES

1. Draw or paint aptly illustrated pairs of constrasting words such as "tall" and "short", "coarse" and "fine", "slender" and "stout". The perceptual

development of the child as this is vital to second language learning should be developed through pictorial representation of the child's concept of various nouns, adjectives, verbs of motion.

2. Provide visual cues via dots, lines, blots, shapes and have the child complete the picture as he sees it.

3. Explore the range of expressions possible with variations of one colour or single design concepts such as line, texture, light and dark.

4. Motivation can be provided through teacher reference to unusual situations: "You are in Winnipeg". "You are on a train". "You are at a zoo". "You are standing on a street corner".

5. Preparation of an illustrated alphabet book, dictionary, glossary of first language expressions, etc., is useful reinforcement for the language arts curriculum.

REFERENCE MATERIALS

Elementary Art Curriculum Guide - of the Province of Alberta is an excellent publication and should be available to all elementary teachers. (If a copy is not available please contact the Curriculum Division, Yellowknife.) Detailed information is provided with respect to the development of an art program; development of units of work; explanation of art activities; art supplies required; an extensive book and audio-visual bibliography among other items. No classroom should be without this publication.

The Canadian Indian, Symington, F., McClelland and Stewart, Toronto, $20.00 (approx.). An expensive, but useful pictorial record of the heritage of the Indian people. Included are paintings, designs, masks, carvings, implements as these were unique to the various cultures. One copy for the school library would provide relevant source material.

Eskimo Sculpture, Swinton, G., McClelland and Stewart, Toronto $14.00 (approx.). A collection of outstanding work by Northern artists. Highly illustrated in both black and white, and colour with accompanying explanatory text. One copy for the school library would provide relevant source materials.

Eskimo Stories, Nungak, Z., Arima, E., Information Canada, Ottawa, $3.00. For each story there is at least one black and white illustration of an Eskimo art object. Both stories and illustrations are welcome additions to any art program. Price suggests that multiple copies could be made available in larger schools.

The Group of Seven, Mellen, P., McClelland and Stewart, Toronto, $20.00 (approx.). A lavishly illustrated volume containing a representative sampling of the works of the best known group of Canadian painters. For stimulating ideas with regard to media, topics, expression, design, realism, impressionism, etc., no school library should be without one reference copy.

Pitseolak: Pictures Out of My Life, Oxford University Press, $9.95.

Harpoon of the Hunter, Markoosie, McGill-Queen's University Press, Montreal, $4.95.

Tales From the Igloo, Metayer, M.G. Hurtig Publishing, Edmonton, $4.95.

Windigo, Schwarz, H., McClelland and Stewart, Toronto, $3.95.

Elik, Schwarz, H., McClelland and Stewart, Toronto, $7.95.

Potlatch, Clutesi, G., Gray's Publishing, Sidney, B.C., $6.25.

All of the above mentioned books provide samples of the artists' expression of Eskimo and Indian painters. The textual material can be incorporated into Language Arts and/or Social Studies curricula.

Akavak, Takta' Liktak, The White Archer, Houston, J., Longman's of Canada, Toronto, $3.95 each (approx.).

The three volumes have been illustrated by the author, a former resident of the Eastern Arctic, who was instrumental in encouraging the growth and developmental of Eskimo artistic expression. The stories are most suitable for incorporation into Language Arts program.

Additional art references are listed in the Section Arts & Technologies.

ARTS AND TECHNOLOGIES

> I listen and I forget.
> I read and I remember.
> I do and I understand.
>
> Ancient Chinese Proverb

Throughout life, non-verbal communication is an integral part of language behaviour. When a person is learning through the medium of a second language, fluency in that language is important before full understanding can be realized. In a situation where facts must be learned before fluency in the language is reached, then a non-verbal approach to learning should be employed.

For young children in school, surrounded by unfamiliar people and foreign language, motivation to learn in that language is of vital importance. Language will not grow in a vacuum, only in relationship with materials and situations that give rise to meaning. New materials present an exciting and concrete challenge to children and the time comes when they feel the urge to communicate. Then, when they learn words, they learn them in the context of an enjoyable experience, surrounded by materials both concrete and familiar.

To achieve understanding, young children cannot always go straight to abstractions. Experience with physical objects is an important first step. In this respect the curriculum should be thought of in terms of activity and experience rather than merely as knowledge to be acquired or facts to be stored. An audio-visual approach to teaching has proved to be an asset to the spoken and written word. Still more beneficial is a visual-manual approach, particularly where there is a second language barrier. Certain education programmes of a visual-manual nature have developed to a fractured state where individual aspects are taught as "pure subjects". For example, an all too familiar approach is to teach art for art's sake alone. This may be acceptable in a stable one-language situation, but the whole gamut of arts and technologies is far too valuable in the north as a vehicle of learning to be treated in an isolated context. The arts and technologies must be used for the introduction, establishment and development of learning situations for all subjects. Their integration is automatic as they can, and do, encompass everything within the students realm of learning and understanding.

INTRODUCTION

The following outline of an integrated approach to the Arts & Technologies is not, in itself, a curriculum guide. Instead, it lists those activities which may be included in an integrated programme, and explains briefly how and why the curricula in Art, Industrial Arts and Home Economics may be combined in the Primary and Elementary years and used as an introductory phase to the more formalized structure of the Junior High and Senior High programmes in the three individual subject areas.

Teachers using an integrated approach to these practical areas are advised to draw their resources from all three curriculum guides, and from the reference books listed at the end of the introductory section.

AIMS AND OBJECTIVES

1. To develop stronger, more realistic programmes in the whole field of subjects which have predominantly non-verbal methods for their teaching.

2. To encourage the use of the varied skills and resources of as many teachers as possible, together with the skills and resources of the Northern peoples.

3. To provide the basis of a programme which can be developed and varied to meet the needs of Northern students at a community level.

4. To encourage greater use of existing facilities and to permit more economical construction of new facilities.

THE RATIONALE

An Integrated Approach to Art, Light Crafts, Industrial Arts and Home Economics.

Industrial Arts and Home Economics cannot be considered independent teaching areas in a school curriculum. They rely on a background of learning in areas such as math, science, social studies and language and, in turn, they provide a background and motivation for learning the subjects upon which they rely. On this basis it follows that Industrial Arts and Home Economics are interrelated with the general subjects of a school curriculum.

There is no precise dividing line between Industrial Arts, Home Economics and the whole spectrum of crafts, whether they be industrial, domestic, aesthetic or cultural crafts, and again there is no fine line dividing the crafts and art (what is art?)

Even though separate curricula may be produced covering various aspects of the total programme, it is essential to keep in mind a definite integration of objectives and content in the art, craft, industrial arts and home economics areas. Perhaps the most descriptive title to embrace all the subject areas would be Arts and Technologies.

With an integrated approach to the teaching of Arts and Technologies there is no deviation from the general educational objectives for each area. The major advantage in an integrated approach is that learning concepts and desired experiences, common to several areas within the programme, may be presented uniformly and without duplication throughout all areas. (e.g. minerals - in foods, glazes, leather dyes, mineral oils, metallic minerals.) The experiences to be gathered from Arts and Technologies programmes are common to all areas, since every area deals in situations where both the head and hands are in co-ordination. These experiences are more readily outlined in list form.

Age	Desired Experience
5-9	Sensual, aesthetic, social, practical
10-12	Sensual, aesthetic, social, practical, cultural
13-14	Sensual, aesthetic, social, practical, cultural, theoretical
15-18	Sensual, aesthetic, social, practical, cultural, theoretical, technological

These age divisions are only arbitrary breaks in the total programme to show approximately where experiential stresses may be laid and where new experiences may be introduced. The development of experiences will naturally parallel the development of skills and knowledge throughout the programme.

Arbitrary divisions can be made to break the arts and technologies into three main areas - performing, manual and visual.

1. Performing arts and technologies cover a) drama - animate and inanimate. (i.e. scripted, ad lib, puppets and marionettes, musicals, opera, film). b) dance (as cultural expression in rites and ceremonies, or as recreation). c) music (vocal and instrumental).

2. Manual arts and technologies include sculpture, modelling, carving, cultural crafts (i.e. crafts pertaining to different ethnic groups) industrial crafts such as ceramic, leatherwork, lapidary, industrial arts in woods, metals, plastics, mechanics, etc.; domestic crafts such as needlework, weaving, embroidery, etc.; home economics in sewing, cooking, grooming, interior decoration.

3. Visual arts and technologies include painting, drawing, photography, all printing methods from batik to offset, film, television, etc.

Again, no particular activity in the arts and technologies can be pigeon-holed in a specific learning area. Every activity listed above could easily be placed within any of the three main areas. A total interrelation of activities in arts and technologies demands an integrated approach to their teaching.

ARTS AND TECHNOLOGIES AREAS

PAINTING - oil, tempera, dyes, etc.
DRAWING - pencil, crayon, charcoal, ink.
PRINTING - lino and wood block, silk screen, vegetable sign press, platen press, offset press.
DYEING - batik, tie and dye.
ETCHING - acid, paste and scratch methods.
COLLAGES - mosaic, scrap patterns, junk art.
MODELLING - paper, wire, string, clay, plaster, plasticine, papier-mache.
SCULPTURE & CARVING - clay, soapstone, wood, chalk, salt, soap, plaster, candles, ivory & bone, miniatures - cultural influence.

CERAMICS - moulding, slip casting, coil, slab and pinch, modelling, throwing.
METAL ENAMELLING - allied with ceramics and jewellery.
BOOKBINDING - single and multi-section, cover and binding methods.
BASKETRY & CANEWORK - willow and rattan, grass and bark strip.
PUPPETRY & MARIONETTES - making characters, producing plays, technical facets.
WEAVING & KNITTING - homemade looms.
EMBROIDERY & APPLIQUE STITCHERY - multi-cultural influence.
BEADWORK & MOOSEHAIR WORK - cultural influence.
FELT & DUFFEL WORK - toys, appliques, tapestries, mobiles - cultural influence.
LEATHERWORK - multi-cultural design, tanning and preparation.
LAPIDARY - local rocks and gems, allied with jewellery.
ART METALWORK - copper, brass and aluminum ware, plaques, trays, utensils.
PHOTOGRAPHY - allied with television, movies, offset printing, book production.
PLASTICS - casting, molding, fabrication, lamination.
WOODWORK - hand and machine processes allied with craft areas.
METALWORK - hand and machine processes, allied with craft areas.
POWER MECHANICS - small engines, power sources, maintenance.
ELECTRICITY/ELECTRONICS - power supply and control, radio.
DRAFTING - allied with all forms of graphic representation.
GROOMING - design, posture, health, diet, dress design, costume & makeup.
SEWING - allied with craft activities and as a technology area.
INTERIOR DECORATION - allied with art, industrial and domestic areas.
TELEVISION & MOVIE PRODUCTION - as forms of graphic communication.
DRAMA & MUSICAL PRODUCTION - as animate and inanimate art, allied with most areas.

EXPLANATORY NOTES ON ARTS AND TECHNOLOGIES AREAS

Painting and Drawing (Arts) can be introduced from the very earliest age. The application of colour and line have an instinctive appeal as forms of expression and communication. With a carefully directed programme, various skills and means of expression can be developed such that colour and line may be used and appreciated in all other art and technology areas. Encourage the use of a variety of media such as tempera, natural dyes, pencil, crayon, charcoal, inks. Due to expense and additional skills required, the use of oil and acrylic paints are best restricted to much older students.

Printing (Arts & Technologies) methods vary from the simple to the complex. Essentially, printing is the transposing of an idea or expression from one medium to another by means of a liquid colour vehicle. This expression may be repeated in rhythmic form or on random or one-time basis. The simplest forms of printing using vegetables, cork, rubber, etc. may be introduced from a very early age; printing from lino or wood block, requiring a greater degree of manual dexterity and skill with cutting tools, is best introduced at approximately age 10. Silk-screen printing may be introduced at age 11, sign press at age 12, platen press at age 13 and offset press at age 14. Printing methods may be taught as art forms in their own right, but they are best allied with other areas such as bookbinding, photography, textiles and fabrics, ceramics, etc.

Dyeing (Arts) methods have an appeal for all ages. The simplest form of introducing design into dyeing is with the tie-and-dye method where even the best laid plans can sometimes go astray. These "engineered accidents" in colour can lead to some surprisingly attractive designs. The Batik method of dyeing is a more controlled activity and varying degrees of complexity of method may be introduced to suit every age group.

Collages, Mosaics, Modelling, Junk Art (Arts) using paper, wire, plaster, string, papier-mache, foam plastics, rubber and a host of junk both natural and synthetic, it is possible to develop a programme of art work of amazing appeal to young and not-so-young students. Visual, tactile and three-dimensional displays may be related to many other areas (e.g. abstract embroidery, kites and aerodynamics, texture and molecular structure, "tin" craft, and metals technology, models and mechanics).

Sculpture and Carving (Arts) Possibly a "natural" choice for a northern student, the basics of carving may be introduced at an early age with the carving of wax, salt, soap, candles, etc., at approximately age 10 with plaster carving and age 12-13 with soapstone, wood, antler and ivory carving. The spatial relations involved in the child's mental processes can prove to be an untapped intellectual reservoir.

Ceramics (Arts & Technologies) The carving of leather-hard clay and the modelling of soft clay have great appeal for first-grade students and beyond. More satisfaction from achievement is derived if students from age 9 and up are introduced to most other ceramics such as slip-casting and coil, slab and pinch methods. The manual dexterity required for thrown-ware will probably not be achieved until approaching ages 13-14. Plaster casting can be included with ceramics work as a start towards making moulds for casting soft metals and plastics.

Bookbinding (Arts & Technologies) is probably best introduced at the age of 9 years. The varying degrees of complexity of the subject makes it particularly suited to students in every year up to senior high. The appeal of bookbinding is increased when the students have a background of experience in the painting of decorative end papers and covers, sewing techniques and perhaps some lettering techniques. Making books can be a very "personalized" craft activity and, for best achievement, keep a purpose in mind for every book made (e.g. art notes, photographs, memos, shopping lists, science, technical sketches, etc.)

Basketry and Canework (Arts) These have been traditional craft activities within most cultures. Although other materials have replaced the woven articles for reasons of convenience and economy, there is still a great deal of value in the craft in the production of functional items. Technological societies reduced the need for cane and willow ware to the decorative and "boutique art" form and, in turn, the artists and craftsmen working with woven ware have changed their designs to meet this new demand. As a craft area, willow and cane work are best introduced at approximately age 11. Rattan cane is more easily worked as an introduction, continuing with willow later.

Puppetry (Arts) There are so many facets to puppetry, from simple glove puppets to advanced marionettes, that this activity can be introduced at any age level. For the little children the dramatization and character acting is far more important than the mechanics of making a puppet. A wealth of language and expression can evolve from an activity which is, essentially, fun.

Weaving, Embroidery, Applique, Stitchery, Knitting, Felt and Duffel Work, Bead-Work, (Arts) In these areas of domestic crafts there can be a great amount of interest from students of all ages. As an abstract art form, and from a mechanical subject such as weaving there can be a considerable interest shown by boys and girls alike. Many traditional crafts from a variety of cultural groups may be introduced in these areas. Basic techniques learned in the handling and sewing of cloth and other materials are valuable preliminary studies for the more formal areas of sewing and dress design.

Leatherwork (Arts & Technologies) Many teachers look at handmade leather goods decorated in the American style and make two decisions: first, they don't like it and second, they could never teach it. Fortunately a good course in leatherwork need not include any dressed work of this nature. Leathers, like woods have their own characteristic grains, colours and textures. They may be made up into very attractive articles with no decoration added in any form. Once students have been shown modelling and decorating techniques it will not take them long to make their own personalized and northern designs. Leatherwork courses need not be restricted to the key purse, belt and dog collar level. Much more satisfaction can be gained from giving students, with some experience, projects such as travel bags, jackets, handbags, gun cases, etc. In simple form, leatherwork can be introduced at the age of 11 years. Complexity of work can be increased as the students develop greater manual dexterity.

Metal Enamelling, Jewellery, Lapidary (Arts & Technologies) As an art form, these three areas of work have become very popular and tremendous amounts of interesting work can be done with very little equipment. They are, essentially, subjects for junior high school studies as they have a close relationship with metalwork, ceramics and plastics.

Art Metalwork, Etching (Arts & Technologies) Most of the work in these areas is with non-ferrous metals and glass. Although the major approach is through the artistic form, the handling of softer metals at the age of 13-14 years is a most suitable approach to the technology of all aspects of metalwork. The apparent boys-only appeal of these areas is soon dispelled when you observe what interest girls can have and the quality of work that they can produce.

Photography (Arts & Technologies) This area of art and technology has a very strong appeal to students of all ages. For young children, photographs taken personally have a creative influence on their written work based on the subject photographed. For intermediate age students, motivation to write becomes much stronger if passages can be illustrated with suitable photographs of their choice. The mechanics and chemistry of the photographic process appeal more to older students at the junior high level. As an art form there are infinite ways to approach photography, with special lighting, portraits, exposure differences, etc. Filmstrips appropriate to specific subject areas may be made easily and immediately. Still photography is a natural introduction to lead in to motion picutres and video-tape recording. It can also be important in the keeping of visual records of school work in general.

Plastics (Technologies) Not too many years ago plastics were new materials and, as such, were not highly regarded in school studies. Currently, plastics are almost on a peer status with woods and metals as materials for technological studies. Much of a plastic course may be taught with very little equipment apart from a reliable source of heat and a few cutting tools. The four basic methods of working plastics are casting, foaming, laminating and general fabricating. All four methods have a relationship with other craft and technological areas in the making of moulds, jewellery, tool handles, fibreglass boats and other articles. Introduce plastics at about age 12-13 years.

Woodwork and Metalwork (Technologies) These areas of technology can still be considered the most valuable when teaching materials, methods, and related information. The many facets of the two subjects embrace almost every other art or technological area. A certain amount of sophisticated equipment is necessary to allow the teaching of good, sound courses in the two areas, and some special construction or adaptation of classroom facilities is also required. Although it may not be possible in some schools to teach woods and metals as full technologies, a considerable amount of tools and materials from both areas is required for use in all other art and technological activities. Introduce these areas at about age 12.

Power Mechanics (Technologies) Essentially, power mechanics is a technological area. As a school subject it has great appeal to boys and a surprising amount of interest can be shown by girls. Students with a basic understanding of mechanics tend to show much more interest in the principles of internal combustion as taught in regular science lessons. The amount of tools and equipment needed for a simple course in mechanics is very small and, apart from exhaust extraction, the simplest of facilities are required. In the north, seasonal motivation can help to dictate planning for work - e.g. snowmobiles in the autumn, outboard engines in the spring. Interested and adept students can be encouraged to investigate other power areas in jet propulsion, ground effect machinery and transmissions. Introduce power mechanics at approximately age 14.

Electricity/Electronics (Technologies) Study in this area can continue to a very advanced level but, at an introductory level and as an adjunct to a science programme, a considerable depth of understanding can be given through the simplest of electrical models and radios. In kit form, the electric motor, the simple one-tone radio and testing equipment is easily understood and easily taught. Motivation generated, after successful construction of a working electrical model, makes the teaching of electrical theory a much easier task. Introduce this area at about age 13.

Drafting and Interior Design - Although drafting and interior design have been listed here as a separate area, they do have a direct connection with most other art and technology areas. Drafting is an all-embracing title for sketching, design and dimensional pictorial views, and it has a direct relationship with all other forms of graphic representation and reproduction. By teaching drafting with all the other areas in mind, the subject can have a lot of appeal to both boys and girls. Interior design will include most aspects of drafting but could be more heavily weighted toward fabrics and colour (for girls), and furniture and household articles (for boys). Introduce the formal aspects of drafting at age 12.

Sewing, Cooking, Grooming, Family Living and Management (Arts & Technologies) These areas may be easily identified as a Home Economics programme but they have been broken into various headings to more easily explain where they have a direct relationship with other areas in the art and technological programme. Sewing may have the greatest degree of integration with the other areas in that the design, manufacture and decoration of fabrics would link with applique stitchery, weaving, embroidery, silkscreen printing, sketching, sewing of leathers, design and manufacture of northern clothing, beadwork, home tanning and fur sewing, etc. (Cooking as an art is perhaps better explained by a French chef!) In the area of grooming, apart from personal hygiene, the whole gamut of makeup may be related to dram., production as well as good looks, and smart clothing and accesories fall into the areas of design, i.e. appearance, fitness for purpose, colour harmony, quality manufacture, consumer education, etc. Family living and family management are areas leaning more toward technological study. Design for living, comfort, economy, home heating and lighting relate to many aspects of drafting, electricity, woodwork, metalwork, etc. By careful correlation of studies, these "home economics" areas have as much value for boys as they do for girls. These areas are, essentially, geared to age 12 years and up, but many aspects of study will appeal to younger children.

Video-Tape and Motion Picture Production (Arts & Technologies) Drama and Musical Production (Arts & Technologies) These areas belong to the more experienced students, preferably age 14 years and up, but only for the technological aspect! Students from ages 5-15 years become the actors, dramatists and playwrights, costume designers, lighting men, makeup and set designers, ticket and programme printers, advertisers, caterers, etc. The mechanics and direction of productions are areas of study for senior students, but almost every other area of an arts and technology programme can be involved in their final product.

SUGGESTIONS FOR IMPLEMENTATION

There are several variables to be considered when planning the establishment and operation of an integrated course. Foremost are facilities, equipment, staff and method.

Facilities

In descending order of convenience, facilities suitable for programmes in Arts and Technologies are listed below.

1. A group of interconnected rooms especially planned for the program.
2. One very large room designed for the programme.

3. Art, Industrial Arts and Home Economic rooms separated throughout the school.
4. Industrial Arts and Home Economics rooms only, designed specifically for their own respective programmes.
5. Classrooms, basements, warehouses, etc., which have been converted to practical rooms.
6. Regular classrooms,

N.B. An Arts and Technologies room under category 2 above has been designed and is planned for incorporation into schools under the building programme. They will be only added to those schools which presently do not have adequate Industrial Arts and Home Economics facilities.

The facilities that you have will, essentially, dictate the extent to which a programme can be developed. Whatever facilities are used it is advisable, if possible, to keep only one area (single room, connected rooms, open area, etc.) set out for the programme. This naturally will allow for easier control and ease of transfer from area to area.

When a regular classroom is used a certain amount of construction of storage units and work areas must be planned (e.g. drawers and cupboards to separate equipment and supplies, desks which convert to work tables and vice-versa).

When Industrial Arts and Home Economics rooms are provided in schools, any conversion required is best done in the Industrial Arts room. The majority of art and craft activities tend to be "messy" and should be kept together. The remaining activities can be conducted in the Home Economics room with almost no alteration to existing facilities.

When an Art Room is included in a school with Industrial Arts and Home Economics, then a minimum of conversion is necessary. The major consideration is in the area of equipment which may have to be shared and hence moved frequently from room to room. By utilizing the Industrial Arts and Home Economics rooms for the majority of craft activities, the "art" room can be retained for those aspects of the programme which require considerable open area or special equipment, e.g. photography, filming and video-tape recording, drama and puppet theatres, murals, displays, etc.

Equipment

Much of an arts and technologies programme can be taught with a minimum of equipment. Many schools would be able to conduct a programme with what they have already, or with what they can share amongst the individual programmes in progress. In fact, one reason for an integrated approach to the whole programme is to encourage the sharing of equipment and a means of getting the best use from both facilities and equipment.

For smaller schools able to approach an integrated programme from the "art" aspect, and which have no Industrial Arts or Home Economics equipment, there could be considerable expense involved as their programme develops into industrial crafts. (Beyond Industrial crafts, the technologies areas almost require a special room, etc., and it may be assumed that the small school would hold the development of their programme until special facilities were built.

Suggested Method of Development of Facilities and Programme

1. Regular classroom - construct or create suitable storage and work areas - develop from regular school art programme to light crafts to industrial, domestic and cultural crafts, to possibly limited technologies. Then delay further development until an Arts and Technologies centre is constructed.

2. Home Economics and Industrial Arts rooms - convert Industrial Arts room to allow the teaching of art and light crafts, develop to industrial crafts and "messy" cultural crafts, e.g. stone carving, making snowshoes, etc. Redesign Home Economics room to accommodate domestic crafts and cultural crafts, e.g. home training, fur sewing, beadwork, applique, etc.

Teaching Staff and Method

Most schools already have programmes in art. Many schools are developing industrial arts and home economics programmes. If you plan to implement into your school an integrated approach to all areas of the arts and technologies, then the question arises as to who will teach the programme. For management purposes it is so much easier if one person can operate things, but there is such a variety of skills and experiences to consider that the collective experience of several teachers would probably be of much more value of the students. For the benefit of creating a rich programme it is worth the risk of teachers getting into each other's hair for the first few months of operation. For the teaching of cultural crafts it is advisable to approach people from the local community and have them teach under contract. Previous experience has shown that it is better to have both the local person and the teacher in the room at the same time. This way the local person can teach skills and the cultural background to the skills and the teacher by cross-reference to other subject areas, can develop a lesson pattern from the work (he can be learning the skill from the local person, as well).

In the final analysis an integrated programme as outlined in the foregoing affords the opportunity to make the most of what we have in terms of human, as well as physical, resources. It is now a matter of getting started. Hopefully, "some" ideas from the preceding pages will help you along the way.

RECOMMENDED REFERENCE AND TEXTBOOK MATERIALS

Teacher Reference

Title	Authors	Publisher	Cost
* Crafts Design	Moseley et al	Wadsworth	18.90
* Creative Hands	Cox	Wiley	12.25
* Handicrafts for Children	---	Dryad	6.50
* Teaching Children about Technology	Scoby	McKnight	9.56
* Art for Today's Schools	Horn	Davis	7.95
* Pahlman Book of Interior Design	Pahlman	Viking	13.75
* Architecture	Spence	McKnight	10.20

Arts and Technologies Texts for Teachers and Students

Title	Authors	Publisher	Cost
* Applique Stitchery	Lawry	Reinhold	6.95
* Creative Use of Stitches	Guild	Davis	3.75
Design and Embroidery	Cliffe	Arnold	2.88
Sew a Fine Seam	Wilson	McGraw Hill	4.95
Guide to Modern Clothing	Sturm & Grieser	McGraw Hill	7.75
* Meet Judy	Dingwall	McGraw Hill	3.95
* Foods & Home Management	Dept. of Educ.	B.C.	3.75
Homemakers of Tomorrow	Toronto Home Ec. Teachers	Longman's	3.00
Your Home and You	Greer	MacMillan	5.00
* Junior Homemaking	Jones	Longman's	3.00
* Canadian Cookbook	Wattie	Ryerson	8.95
* Northern Cookbook	Ellis	Queens Printer	4.50
Silk Screen Printmaking	Shokler	?	5.15
* Silk Screen in Schools	Woolaston	Dryad	6.60
* Silk Screen Printing	Eisenberg	McKnight	2.12
* The Use of Vegetable Dyes	Thurstand	Dryad	1.50
* Dyed and Printed Fabrics	Hobson	Dryad	2.00
* Linoleum Block Printing	Kafka	McKnight	2.12
* The Hand Decoration of Fabrics	Kafka	McKnight	6.32
* Activities in Ceramics	Seeley	McKnight	2.28
Ceramics	Brennan	Goodheart Willcox	3.35
* Ceramics	Nelson	Holt Reinhart Winston	13.25
Terracotta	Nicol	Oxford	3.50
* Pottery Without a Wheel	Tyler	Dryad	2.95

	Title	Authors	Publisher	Cost
	Clay	Ellis	Queens Printer	4.50
*	Hand Puppets & String Puppets	Lanchester	Dryad	2.50
*	Puppetry	Nicol	Oxford	3.50
*	Willow Basketwork	Knock	Dryad	2.35
*	Canework	Crampton	Dryad	2.95
*	Bookbinding	Bates	Dryad	4.50
*	Basic Bookbinding	Lewis	?	1.35
*	Learning to See, Books 1-5	Rowland	Ginn	1.50 ea.
*	Learning to See, Book 1-5. Teacher's	Rowland	Ginn	1.10 ea.
	Pattern and Shape	Rowland	Ginn	3.60
	Pattern and Shape - Teachers notes	Rowland	Ginn	1.00
	The Development of Shape	Rowland	Ginn	3.60
	The Development of Shape - Teachers notes	Rowland	Ginn	1.00
	The Shapes We Need	Rowland	Ginn	3.60
	The Shapes We Need Teachers notes	Rowland	Ginn	1.00
	Educating the senses	Rowland	Ginn	1.20
*	Picture Making	Toronto School Board	Griffin	1.70
	Crafts for Children	May	Lane	2.85
	Arts from Scrap	Reed	Davis	1.70
*	Charts on Art & Crafts Techniques	Craftool BP-11-AZ	(15 Charts)	3.25
*	Making Jewellery	Hartwell	Hulton	4.10
	Jewellery and Enamelling	Pack	?	6.75
	Metalwork and Enamelling	Maryon	?	8.00
*	The Art of the Lapidary	Sperison	?	8.00
	Glasscraft	Kinney	?	7.50
*	Leathercraft	Zimmerman	Goodheart Willcox	3.25
	General Leathercraft	Cherry	McKnight	2.85
*	Leather	Curriculum Division		free
*	Plastics Technology	Swanson	McKnight	7.45
	Plastics	Cope Conaway	Goodheart Willcox	3.25
	Fibreglass	Steele	McKnight	4.65
	Pattern and Design	Cannon	Lund Humphries	3.95
	A designers Notebook	Anderson	McKnight	6.32

Title	Authors	Publisher	Cost
* Contemporary Furniture Designs	Heppenstahl	Longman's	2.90
* Industrial Arts Drafting	Walker	Goodheart Willcox	5.65
Drafting	Brown	Goodheart Willcox	3.35
Design Textbook	Lindbeck	McKnight	5.76
Sculpture	Lewis	Knopf	3.06
* Creative Log Sculpture	Matthews	Heinemann	4.20
* Modern Woodworking	Wagner	Goodheart Willcox	7.65
Woodworking	Wagner	Goodheart Willcox	3.35
Woodworking for Industrial Arts	Madden	Goodheart Willcox	5.65
* Contemporary Design in Woodwork I	Glenister	Longman	5.70
* Contemporary Design in Woodwork II	Glenister	Longman	5.70
* Contemporary Design in Metalwork	Larkman	Longman	5.70
* Finishing Technology	Soderberg	McKnight	8.60
Electricity	Gerrish	Goodheart Willcox	3.35
* Electricity/Electronics	Gerrish	Goodheart Willcox	7.10
* All About House Wiring	Mix	Goodheart Willcox	3.60
* Modern Metalworking	Walker	Goodheart Willcox	8.75
Metalworking	Boyd	Goodheart Willcox	3.35
* Art Metals	Siegner	Goodheart Willcox	3.35
* Modern Welding	Althouse	Goodheart Willcox	10.25
* Machining Fundamentals	Walker	Goodheart Willcox	7.65
* Machine Tool Technology	McCarthy	McKnight	2.68
Contemporary Design in Metalwork	Glenister	Longman's	5.70
* Etching, Spinning, Raising and Tooling Metal	Smith	McKnight	3.25
* Photo-Offset Fundamentals	Cogoli	McKnight	8.92
Printing Layout & Design	Delmar	Delmar	7.90
* Practical Photography	McCoy	McKnight	3.85
Graphic Arts	Kagy	Goodheart Willcox	3.35

Title	Author	Publisher	Cost
* Kodak pamphlets and books on all aspects of Photography.			
* Automotive Mechanics	Grouse	McGraw Hill	10.95
Small Gas Engine Training Manual	Pipe	S.A.M.S.	2.95
Care & Repair of Small Gas Engines	Pipe	S.A.M.S.	1.00
* All About Small Gas Engines	Purvis	Goodheart Willcox	6.00

* Books with special recommendation; remaining books are good additional information.

HEALTH

The Health Curriculum is regarded as being potentially the most delicate aspect of the school program requiring extensive sensitivity on the part of the teacher for its effective implementation and utilization. Moreover, the considerable diversity of Northern settlements and situations implies that a single prescriptive curriculum would be anything but appropriate in terms of meeting local needs. For these reasons the outline that follows has been kept to minimum proportions. Guidelines are offered, but in every instance it is suggested that the teacher work closely with the people of the particular settlement in developing a health program that is relevant and useful in terms of local needs and conditions.

TEACHER AWARENESS

Typically health curricula are written as if all children came from identical home backgrounds characterized by all of the amenities of middle-class living. Furthermore, health programs attempt to convey certain attitudes toward living and particular value systems which, although they may be applicable to one segment of the population, are not universally acceptable or appropriate. Too frequently assumptions are made that imply that there is a "right" way to mold people into patterns of healthy, happy living. It is with these concerns in mind that the following notes are provided in the hope that the Northern health curriculum can avoid some of the common pitfalls.

Nutrition: Foods and diets must be taught in terms of the realities of economic and social conditions. To teach the Canadian food rules or some other arbitrary standard makes little sense if the students are living at bare subsistence standards. For example, to feature orange juice, toast, bacon and eggs and a tall tumbler of milk on a bulletin board display and thereby convey the idea that this is what constitutes breakfast is as pointless as it is heartless, if the child comes from a home where tea, bannock and fish is the staple diet. Not only can the child not relate to this ideal but it suggests that what his home has to offer is of inferior quality.

As is the case with every aspect of the curriculum the health teacher must begin with the known and the possible rather than the foreign and the ideal.

Care of the Body: Presumed standards of middle-class cleanliness are inconsistent with the harsh realities of Northern living particularly if you happen to be Indian, Eskimo or Metis. Many homes simply do not have the available water supply to make frequent washing (clothes and the body) a practical possibility. It is fair to state that people can do the best with what they have but for schools to make an issue with respect to personal matters over which the child and his parents have little or no control is unfortunate, to say the least. Furthermore, soap, detergents and the like do cost money which is a distinct limitation in itself. The school must exercise discretion in developing a realistic program that will be compatible with community practicalities. Obviously, consultation with the parents is a vital necessity.

Guidance: (For the sake of brevity, social, emotional and mental development are considered in this category.) It is in areas of subjective judgement of this type that the health program can fall into the trap of inculcating attitudes and values which are meaningless in the Northern context. It is not the obligation of the school to indoctrinate "appropriate behavior patterns", whatever that term may mean. It is the obligation of the school to provide the opportunities for the child to examine, explore, and eventually develop a pattern of behavior appropriate to himself. Through individual and group activities; through co-operation and competitive experiences the child can be provided with the opportunity to make his choices and decisions.

Social Problems: Alcohol, drugs, intoxicants of various description (glue, gasoline fumes, shoe polish, hair spray, etc.), and tobacco pose serious health and safety problems. The school must provide factual, dispassionate information with respect to these matters but, at the same time, should avoid dealing with them as "one shot" efforts. Commonly, one unit of work on any or all of these items is included somewhere in the child's educational experience and then the matter in question is conveniently dropped. The importance of these questions is such as to require continuous treatment and reinforcement throughout the school program. The advice of medical and community resource personnel should be sought in planning this aspect of the program.

Sex Education: Teaching about human reproduction, venereal disease, contraception, abortion, and related topics is a legitamate and important aspect of any health curriculum. Again, it must be noted that a "once over lightly" exposure to this area is not sufficient. Re-examination and reinforcement will be necessary throughout the grade levels. Medical and community advice with respect to the instruction appropriate for a given settlement should be sought.

Rest, Sleep and Relaxation: Several variables must colour the approach taken in the classroom to this aspect of the program. Environmental conditions (hours of daylight, hours of darkness) affect sleeping patterns. Traditional life styles with respect to working and resting influence daily routines. Housing conditions may not be conducive to individual privacy. All of these factors suggest that the teaching of middle-class sleeping and resting patterns is inappropriate in many instnaces. To instruct, if not reprimand, a child to get eight hours of sleep nightly and rest after every meal is futile if the child comes from a home where the physical facilities make it necessary for the family to eat, work, visit, and sleep as a group entity. The child can only operate within the limitations imposed by the physical facilities at his disposal.

In so far as possible the total school program must attempt to reflect and meet the demands that these conditions make upon it.

Safety

Geographical considerations coupled with the absence of facilities that are taken for granted in the South make it mandatory that considerable stress be placed on safety education. Fire, accidents, and illness can become major disasters given the extreme conditions of the winter months, for example. For these reasons alone, repeated emphasis on such topics as fire prevention, gun use and abuse, snowmobile use and abuse, household, community, playground and in-school accident prevention, water safety must be provided. Similarly, diagnosis and treatment of minor illnesses and ailments become valid and vital aspects of the first aid part of the health curriculum.

Representatives of the Northern Health Service should be consulted with respect to the type of education the school can provide in these matters. Concurrently, representatives of the Territorial Fire Marshal's Office can be invited to participate in the school program. Other agencies such as the Red Cross and the St. John Ambulance Society can be most helpful in providing guidance and assistance.

THE CHILDREN WE TEACH

Each child is unique in appearance, in experience and in natural ability but certain characteristics predominate in different age groups. A wise teacher can use these natural tendencies to advantage in the classroom.

Six And Seven Year Olds

Six is an active age when children find it hard to sit or stand still and when their attention span is very short.

Small muscles of hands and arms are not completely developed. Teachers can only co-operate with the degree of maturity they find at this level. Most children can learn to paint, use crayons, work with tools, or cut and paste with a fair degree of satisfaction.

Eyes are not mature in size or shape so that work requiring adjustments from far to near is difficult and tiring for children of this age.

Many six-year-olds are susceptible to colds and communicable diseases. They tire easily and need more sleep than they usually get. Their energy level is often low.

While interest in active play is keen, these children are not well co-ordinated but enjoy free movement and trying new skills of different kinds.

Dawdling often occurs while they explore the world around them.

Moods change often as six-year-olds move easily from laughter to tears.

Sixes are independent and like some responsibility but are relatively new at being responsible for their own safety.

Dramatic play is popular and can be used to advantage.

Interest in working and playing together is growing. They still have difficulty in taking turns, sharing or considering the feelings of others. There is as yet little team spirit or group loyalty.

Eagerness to learn is an endearing trait.

Sixes are more difficult to deal with than at five but wilt under criticism and disapproval. Encouragement and friendly support promote growth and development.

Seven And Eight Year Olds

Physical growth is slow and steady. Children are still very active but show a growing ability to balance activity with periods of quiet play.

Sevens still tire fairly easily and need a balance of active and quiet occupations.

Abstract thinking is beginning. Learning is easier if they are active while they learn. Understanding is better when these children are actively involved in making and handling things.

Language is rapidly developing and is vigorously used in reading, writing and speaking.

A sense of competition is developing along with a certain aggressiveness. Children want to be independent but do not quite trust themselves.

Sevens are very anxious for approval from adults and classmates alike. Teacher and parental approval is an influential motivating factor. Children of this age are anxious to do well in whatever they try.

Sevens need not only support and encouragement but also chances to show independence and self-reliance.

Eight And Nine Year Olds

Physical growth is slow but steady and much active play is needed. These children are able to write well and are often good at craft work of different kinds.

Eye-hand co-ordination has improved and children of this age can handle work which requires near focusing of the eyes. Near-sightedness can develop and eyes should be checked

Organized games delight eight-year-olds. They like to have rules and see that everyone follows them. Eights are -quite reckless and daring and very intense competition should be avoided.

At this age "clubs" are being formed, loosely organized and with many changes of membership. Belonging to a group gives children security and a chance to identify with their own age and sex. It gives them also an opportunity to carry out plans of their own making and the ability to give and take criticism at their own level.

Collections are intriguing at this age. This interest can be exploited to mutual advantage in science and social studies.

Dramatization appears in informal play and is much enjoyed in the classroom. Puppet plays, radio announcing and performing, and read-aloud stories appeal strongly to this group.

Children of this age are argumentative, high-spirited, full of curiosity and interested in the world around them. They are apt to be careless, noisy but very friendly and responsive.

Nine And Ten Year Olds

Physically, most nine-year-olds are much like eight-year-olds except that they are a little better developed and closer to maturity.

Eye-hand co-ordination is improving and the attention span has increased. Children of this age can become very interested and involved for several hours in certain projects or activities. They have ideas and interests of their own which they are capable of carrying out. When a project is no longer interesting, however, it could easily be left unfinished.

Active rough and tumble play is still enjoyed but boys and girls differ somewhat in play interests. Both show spontaneous energy and enjoy active games but girls frequently turn to quieter activities such as skipping or skating.

Children of this age are anxious to learn new skills and to do them well. Because of this interest in perfecting play skills it is a good time to encourage youngsters to learn how to do many different things.

This age group likes realism rather than fantasy in play and in reading. They are eager to know more about their own and other countries as well as more about the people living there.

Nines are fairly responsible and dependable. They are interested in doing things well and have a sense of right and wrong. Real interests are beginning to develop and the children show personalities of their own.

Ten And Eleven Year Olds

Children at this age show marked differences in growth patterns. Those approaching puberty have a period of rapid growth with increases in height and weight. For those not approaching puberty the growth pattern is more regular. Tens are usually energetic and busy and anxious to master new skills. An understanding of the need for teamwork is beginning.

Boys are later in developing than girls which can cause anxiety for both sexes. Children of this age need an explanation about the differences in the physical development between boys and girls and between youngsters of the same sex. Such knowledge can alleviate anxiety.

Physical change can sap energy and the children have periods of "laziness". The tiredness of the rapidly growing young person is in sharp contrast to the energy of the same-aged child not approaching puberty.

Being a group member is important to tens and elevens who need the feeling of belonging and of being like the others. Competence in play skills gives a feeling of confidence so a variety of sports activities allows the youngsters to develop coordination and skill.

Preteens need a chance to let off some steam and to express their thoughts and feelings. They respond well to adults' confidence in them. A feeling of acceptance as an individual as well as an understanding of his own growth and development is important to confidence and security.

Eleven And Twelve Year Olds

Boys and girls at this age are alert and energetic and like to rush around and be busy. They have a real need for teamwork where each feels the support of the others.

Children at this age need an explanation regarding the differences in rates of maturing between boys and girls and between youngsters of the same sex. The knowledge can save many anxieties.

So-called laziness may have a real basis as physical changes taking place may sap a child's energy. Spurts of energy may be followed by periods of inertia. The tiredness of a rapidly growing youngster is in sharp contrast to the energy of a child of the same age who is not nearing puberty.

Emotional and social maturity fluctuates and moods change quickly. These young people are sometimes overcritical of teachers and parents. They need tolerant understanding and support from adults.

Groups, clubs and gangs are important at this age. Children need the security and assurance that a group-belonging feeling gives. Interest in team games is high and competence in play skills gives a needed feeling of confidence.

This is sometimes called a period of disorganization. Feelings change often and the young people are unpredictable, often untidy and uncooperative. They respond to adults who have a sense of humor and who have faith in them. Each needs from adults the feeling of being accepted for himself and a chance to be independent as fast as his maturity will permit.

Adolescence

Special needs of adolescents:

- Conformity with and acceptance by the peer group.
- Adequate knowledge and understanding of sexual relationships and attitudes.
- Adult guidance which is kindly, unobtrusive and does not threaten the young person's feeling of freedom.
- The assurance of security; adolescents seek both dependence and independence.
- Opportunities to make decisions.
- Provisions for constructive recreation.

OBJECTIVES

1. To foster in the child a positive self-image in relation to his cultural heritage.
2. To develop in children a sense of responsibility for individual health and the health of others in the community.
3. To develop an awareness and understanding of fundamental health habits.
4. To develop an understanding of the effects of changing life styles on health needs and to take action in meeting these needs.
5. To develop an awareness of health resources in the community and elsewhere and to learn how to benefit by these resources.
6. To encourage parental understanding and involvement in the child's changing health environment.

CONCEPTUAL OUTLINE

The Five To Eight Year Old Child

TOPIC: The Aging Process.

MAJOR CONCEPT: Aging is a continuous process of growth and development in all structures and functions of the body.

MINOR CONCEPTS: "You" as a person are very important.

Everyone is different. You can do certain things well, better than others; yet some can do things better than you.

Working and playing together is a part of growing up.

Developing behavior patterns is a part of growing up.

Variation in feelings (happiness, sadness, love, hate, etc.) is a part of life too.

Growing regularly is a sign of health.

TOPIC: Anatomy and Physiology.

MAJOR CONCEPT: Good health involves the integrated functioning of mind and body and cannot be fully achieved without sufficient knowledgeable training of basic body structure, developmental patterns of living tissue and interactions of all body systems.

MINOR CONCEPTS: The basic structural unit of life is the cell.

All parts of the body are composed of cells.

Skin cells form a valuable protective covering.

Muscle and bone cells allow us to move.

The heart acts as a pump.

Cells, tissues, organs and systems working together form a human being.

Impressions of the world around us are received through the senses.

Normal growth allows a wide range of differences in individuals.

Exercise is enjoyable and contributes to development.

Sleep and rest are necessary for living organisms.

Cleanliness and good posture contribute to feelings of well-being.

TOPIC: Consumer Health.

MAJOR CONCEPT: Use of health information, products and services is governed by the application of an individual's criteria.

MINOR CONCEPTS: Advertising often affects what people buy, thereby affecting one's health.

Some advertised products can be harmful to the health of children.

Health information, regardless of accuracy can come from many sources.

Much health information comes from family and friends.

Safety precautions must be taken with medicines and other substances.

People are especially trained to provide health care.

Protective measures can be taken to ensure that certain foods are safe for human consumption.

The packaging and preservation of food is important to keep them healthful.

Food laws are made by governments to assist in protecting health.

Precautions have to be taken to protect ourselves and others from disease.

Rules help protect our health. By following the rules we help to protect others.

TOPIC: Dental Health.

MAJOR CONCEPT: Encourage the observance of good dental health practices, including personal care, professional care, proper diet and oral habits.

MINOR CONCEPTS: Teeth are important to us for many reasons.

Different shapes indicate different jobs for teeth to do.

The number of teeth we have changes as we grow.

Daily care is important to dental health.

Teeth can be affected by the foods we eat.

The decaying process can be affected by proper diet and care.

Regular dental care can help maintain healthy teeth.

Many dental accidents can be prevented by safe practices.

Dental care can be available from settlement resources.

TOPIC: Disease Control.

MAJOR CONCEPT: Man is in constant competition with other organisms for the existing energy on this planet. Some of these organisms cause disease. Through education and guidance man can attempt to conquer disease.

MINOR CONCEPTS: A cause-effect relationship has been established between germs and disease.

The nature of many diseases makes it possible for them to be spread from person to person.

Illness has an effect on the way that we feel.

Personal health is significantly linked with personal habits.

We are dependent upon many people to help us when we are ill.

A more serious disease may follow what appears to be an insignificant illness.

Group behavior may affect the health of each individual in the group.

The causes of many diseases are still unknown to medical science.

RESPIRATORY DISEASES

The proper functioning of the respiratory system is necessary for good health.

The respiratory system is vulnerable to invasion by germs.

Respiratory diseases can be avoided through proper health habits.

There are many people in the medical profession who are concerned with the health of the respiratory system.

CIRCULATORY DISEASES

The proper functioning of the circulatory system is dependent upon the proper functioning of the heart.

The circulatory system can be compared to a transportation system.

TOPIC: Drugs and Narcotics.

MAJOR CONCEPT: A knowledge of drugs: what they are, what their benefits are, and how they should be used, can contribute to the prevention of an actual drug abuse situation.

MINOR CONCEPTS: The improper use of medicines which were designed to cure and prevent sickness is usually a dangerous practice.

The abuse of volatile materials such as gasoline and glue can cause damage to human tissue.

TOPIC: Family Relationships.

MAJOR CONCEPT: The family is the basic social institution imbued with the responsibility for providing its members with kinds of experiences which they need for their maximum physical, mental, social, emotional, and spiritual development.

MINOR CONCEPTS: Each of us is a member of a family.

Each of us assumes various roles and responsibilities as members of a family.

Families share experiences and do various things together.

Each of us is a member of a school family.

The school community can help children to stay safe, well and happy.

Adults can help children to stay safe, happy, healthy, clothed, fed, and secure.

Children can make contributions to the family.

There are similarities and differences in family life in other parts of Canada and the world community.

Families help others in the settlement.

The family can foster the fullest development of each individual in the family.

TOPIC: Heredity and Genetics.

MAJOR CONCEPT: Heredity can set limits on potentialities of development, but it does not solely determine what the actual characteristics of an individual will be.

MINOR CONCEPTS: There are similarities and differences among living things.

There are significant ways in which living things are similar.

Environment affects living things.

Living things can induce changes in their environment.

Curiosity about our environment leads to a better understanding of the environment.

Parents, grandparents and remote ancestors contribute to one's characteristics.

Heredity causes all creatures to produce off-spring of own kind.

TOPIC: Human Ecology.

MAJOR CONCEPT: The existance of man depends upon his interrelations with his environment which includes both the inorganic world and other organisms.

MINOR CONCEPTS: Our health is affected by our surroundings.

Living space affects how we feel and how we respond.

Without water and air, human life would not continue.

Noise has an effect on how we feel and act.

There are living and nonliving hazards in our environment.

Each of us can improve our environment.

TOPIC: Human Sexuality.

MAJOR CONCEPT: Human sexuality, which involves our growth and development, as well as the complex drives associated with love and marriage, is the basis for many facets of our behavior.

MINOR CONCEPTS: Living things reproduce in many ways.

Young animals have a need for home, food and parental care.

TOPIC: Nutrition Education.

MAJOR CONCEPT: Optimal growth is dependent upon personal health practices and wise decisions.

MINOR CONCEPTS: All living things need food in order to grow.

Growing regularly is a sign of health.

A variety of food exists from which one can select an adequate diet.

Some foods may be better for the body than others.

Food is kept safe to eat by improved processing methods.

TOPIC: Physical Fitness.

MAJOR CONCEPT: Physical fitness is an essential quality for anyone desiring to make the most of himself and his life.

MINOR CONCEPTS:

Exercise and play contribute to personal happiness, growth, strength, relieving fatigue and tension.

There are suitable times for exercise and play.

Suitable conditions are necessary for play activity.

Daily exercise strengthens the heart and increases the effectiveness of the lungs.

Sleep, rest, and an adequate diet are important for tomorrow's exercise and play.

Good sportsmanship adds to the enjoyment of play activities.

TOPIC: Safety Education.

MAJOR CONCEPT:

Safe living involves the development and use of safety precautions while recognizing the inevitability and appeal of risk taking.

MINOR CONCEPTS:

The responsibility for safe conduct to and from school begins to become an individual's concern.

The community helps in providing safety measures.

We should be aware of many different things when we are walking about the settlement.

Play activities are fun but often need some controls.

Courtesy and conduct are important to good school safety.

We can help others to prevent accidents.

We can practice safety and courtesy away from school to help prevent accidents in play activities.

Safety habits assume critical importance when away from the settlement, particularly when out "on the land".

Education and planned action could save our lives in hazardous situations relating to fire.

Certain physical factors coupled with carelessness can be responsible for falls, a common danger in the home.

There are harmful substances in certain plants, animals and products of which we should become aware.

An understanding of the potential of electricity is important in establishing a safe household atmosphere.

We can assume responsibility for accident prevention.

TOPIC: Smoking.

MAJOR CONCEPT: There is substantial evidence that smoking, particularly cigarette smoking, is harmful to one's health. Individuals must be aware of, and understand the health hazards associated with smoking so they can make an intelligent, personal decision on whether to smoke or not to smoke.

MINOR CONCEPTS: People smoke or refrain from smoking for a variety of reasons.

Cigarette smoking is harmful to the body.

Lung cancer and other chronic diseases are found more frequently among smokers than non-smokers.

Smoking advertisements affect young people in many different ways.

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The Nine To Twelve Year Old Child

TOPIC: Alcohol.

MAJOR CONCEPT: Aging is a continuous process of growth and development in all structures and functions of the body.

MINOR CONCEPTS: The cell is the building block of all living things.

Cells differ in order to perform their specific work.

Like cells form tissues, like tissues form organs, organs with a specific function form systems.

The skeletal system is a multi-purpose system.

Voluntary and involuntary muscles allow us to move and work.

TOPIC: Alcohol.

MAJOR CONCEPT: The increase in consumption of beverage alcohol by all age groups and the apparent acceptance of moderate drinking by society indicate that there is a need for adequate information concerning alcohol so that mature personal judgements can be made concerning its use.

MINOR CONCEPTS: Beverage (ethyl) alcohol is usually obtained from fermentation of fruits and grains.

The effects of alcohol on the body are related to body weight. The immediate effects of drinking are more pronounced in the immature bodies of young people.

Social drinking is acceptable in many societies.

Alcohol is used in many different ways in our society.

People drink for many reasons.

Immoderate use of alcohol may cause many personal and community problems.

Alcoholism is now recognized as an illness which can be treated.

TOPIC: Anatomy and Physiology.

MAJOR CONCEPT: Good health involves the integrated functioning of mind and body and cannot be fully achieved without sufficient knowledgeable training of basic body structure, developmental patterns of living tissue and interactions of all body systems.

MINOR CONCEPTS: The skin performs several important functions.

The digestive system breaks down food so it can be used by cells.

The respiratory system carries oxygen to the cells and removes waste (CO_2) from them.

The transportation system for food, oxygen and waste products is called the circulatory system.

Liquid, solid and gaseous wastes are eliminated from the body by the excretory system.

The nervous system acts as a telephone exchange to receive, interpret, and transmit messages. It is the number one control system of the entire body.

The endocrine system is the chemical regulator of the body.

The reproductive system provides the means of producing offspring.

Injuries, infections and improper diet can affect the functions of the body systems.

Proper exercise, good posture and personal cleanliness insure proper body functions and continual good health.

TOPIC: Consumer Health.

MAJOR CONCEPT: Use of health information, products and services is governed by the application of an individual's criteria.

MINOR CONCEPTS: Consumer health involves wise judgement and selection of health information, products and services that pertain to health.

Emotions, family patterns and values influence selection and use of health information, products and services.

Religious beliefs, customs, superstition, faddism, cults, and family influence consumer buying.

Health agencies and organizations serve, protect and inform the consumer.

Laws and regulations protect our health and the health of others.

Possible harm can result from self-diagnosis, self-medication and the careless ingestion of drugs, medicines and other substances.

Evaluation of standards, health products and health services requires critical thinking.

TOPIC: Dental Health.

MAJOR CONCEPT: Encourage the observance of good dental health practices, including personal care, professional care, proper diet and habits.

MINOR CONCEPTS: Teeth contribute to appearance, digestion and speech.

Structure and kinds of teeth have specific purposes.

Daily personal care promotes dental health.

Tooth decay is usually caused by acids forming in the mouth.

Food habits influence dental health.

Dental supervision is important to controlling dental disorders.

Safe play habits must be developed in order to avoid tooth injury.

Critical thinking must be applied to selecting products pertaining to dental health and services.

Communities may have available resources to help provide for dental care.

TOPIC: Disease Control.

MAJOR CONCEPT: Man is in constant competition with other organisms for the existing energy on this planet. Some of these organisms cause disease. Through education and guidance man can attempt to conquer disease.

MINOR CONCEPTS: We owe our good health in part to the dedication of many scientists.

Microorganisms are among the living things with which we share the earth.

Rapid growth is a characteristic of microorganisms.

Specific microorganisms can cause disease.

The human body has many natural defenses against several diseases.

A disease is not limited to one locale - it can spread from community to community; from one country to another.

Disease is fought on a local and worldwide level.

CANCER

Abnormal cell growth is characteristic of cancer.

The risk of abnormal cell growth can increase because of personal health habits.

Cures have been developed for many types of cancer.

RESPIRATORY DISEASE

The efficient functioning of the respiratory system is impaired by irritation and damage.

Respiratory diseases can be controlled through good health habits.

CIRCULATORY AILMENTS

The circulatory system is susceptible to many diseases.

The circulatory system is influenced by many factors.

Circulatory system research is the concern of many groups and agencies.

TOPIC: Drugs and Narcotics.

MAJOR CONCEPT: A knowledge of drugs: What they are, what their benefits are, and how they should be used, can contribute to the prevention of an actual drug abuse situation.

MINOR CONCEPTS: The need to be a member of a group can be a factor in drug abuse.

Your future can be significantly affected by some of the decisions which you make early in life.

TOPIC: Family Relationships.

MAJOR CONCEPT: The family is the basic social institution imbued with the responsibility for providing its members with kinds of experiences which they need for their maximum

	physical, mental, social, emotional, and spiritual development.
MINOR CONCEPTS:	Membership in a family can give one feelings of pride and well-being. Family problems can be worked out by the family unit. The independent nature of family life requires that each member develop a sense of responsibility. Changes that occur in daily living have their effect on family life. Leisure time activities can affect the family unit. The moral and spiritual values prevailing in the family group can help to shape family relationships.
TOPIC:	Heredity and Genetics.
MAJOR CONCEPT:	Heredity can set limits on potentialities of development, but it does not soley determine what the actual characteristics of a given individual will be.
MINOR CONCEPTS:	Living creatures reproduce then grow as they react and are stimulated by the environment. Organisms inherit traits which modify the environment and they may become modified themselves as they react to experiences. Each parent organism contributes its own peculiar characteristics to its off-spring. Life starts as a single cell which results from the union of two reproductive cells. Potentialities of all characteristics of the living organism are passed along in the fertilized cell.
TOPIC:	Human Ecology.
MAJOR CONCEPT:	The existance of man depends upon his inter-relationship with the environment which includes both the inorganic world and other organisms.
MINOR CONCEPTS:	Human life depends upon water and air. Radiation in the air has come to be considered a pollutant. Disposal of sewage and garbage is an increasing problem. Improper sewage or waste disposal can contribute to the transmission of disease.

Our immediate surroundings including the people in the surroundings have an effect on us.

We are dependent upon many people for safe water and air.

Sanitary conditions are improved through the efforts of many interested groups.

Disaster prevention is the concern of expert organizations.

TOPIC: Human Sexuality.

MAJOR CONCEPT: Human sexuality, which involves our growth and development, as well as the complex drives associated with love and marriage, is the basis for many facets of our behavior.

MINOR CONCEPTS: Living things reproduce in order to perpetuate the species.

Sexual reproduction has advantages over asexual reproduction.

The process of mating is an evolutionary process.

There are similarities and differences in human reproduction and in that of lower animals.

There are many anatomical and physiological differences between the human male and female.

Many significant changes take place during puberty.

Living things give birth in a variety of ways.

The human fetus develops in a unique manner; normal birth occurs when the fetus is developed sufficiently to survive.

TOPIC: Mental Health.

MAJOR CONCEPT: Knowing ourselves helps us to live better with others.

MINOR CONCEPTS: As we grow up we learn to control our own behavior.

We develop and change habits because of experience.

Leisure time activities help develop creativity, friendships, skills.

Consideration and respect for others is important.

It is important to have respect for one's self.

Emotions are normal.

Friendships contribute to a person's well-being.

TOPIC: Nutrition Education.

MAJOR CONCEPT: Optimal growth is dependent upon personal health practices and wise decisions.

MINOR CONCEPTS: Work efficiency depends upon adequate food intake.

Our selection of food depends upon many different factors.

Every food has a story.

All nutrients needed for growth are available through foods.

Some foods do more for us than others.

The digestive system changes the food into a useable form for the body cells.

Feelings and emotions affect the digestion of food.

Many steps are taken to solve world food problems.

TOPIC: Physical Fitness.

MAJOR CONCEPT: Physical fitness is well established today as an essential quality for anyone desiring to make the most of himself and his life.

MINOR CONCEPTS: Physical fitness is necessary to maintain good health.

Physical fitness includes practices other than exercises.

There is an important relationship between the functions of bones and muscles and movement and posture.

Exercise contributes to the efficient functioning of the body.

Participation in a variety of physical activities promotes the development of body symmetry.

Social, mental and emotional values may be derived from participation in a variety of activities.

Conditioning activities serve to prevent injuries in sports.

TOPIC: Safety Education.

MAJOR CONCEPT: Safe living involves the development and use of safety precautions while recognizing the inevitability and appeal of risk taking.

MINOR CONCEPTS: A knowledge of the cause and kind of accidents can help us plan for more responsible action.

Increased freedom in play activities requires safety practices.

School accident prevention depends upon each one of us.

Many home accidents can be prevented by the action of individual family members.

Fire prevention is a critical civic and individual responsibility.

We can undertake responsibility for the safety of ourselves and others.

Knowledge and practice of safety rules in recreational activities helps prevent accidents.

Appropriate responses to hazardous emergency situations should be studied and practiced.

TOPIC: Smoking.

MAJOR CONCEPT: There is substantial evidence that smoking, particularly cigarette smoking, is harmful to health. Individuals must be aware of, and understand the health hazards associated with smoking so they can make an intelligent, personal decision on whether to smoke or not to smoke.

MINOR CONCEPTS: Smoking is a dangerous habit that is difficult to change.

Along with a great increase in smoking in the last 25 years there has been a corresponding increase in lung cancer.

Diseases other than lung cancer are found more commonly among cigarette smokers than non-smokers.

Smoking interferes with many of the body processes.

Cigarette smoking is an expensive habit.

Tobacco advertising can be misleading.

Smoking can affect the performance of an athlete.

HEALTH MATERIALS

No one single series of health textbooks is recommended by the Curriculum Division for use in Northern schools. The reason is that available health textbooks are appropriate for Southern, generally urban conditions, but have limited relevancy to the Northern locale. Until such time as a useful series becomes available it is suggested that schools avail themselves of the appropriate material as this can be obtained from a variety of sources. A classroom reference library can be established by drawing on the resources of the following:

HEALTH EDUCATION GUIDE: A Design for Teaching, Edu-Media, Ltd., 1 Adams Street, Kitchener, Ontario (10.95) Although this teacher reference book is limited by its exclusive treatment and reference to the United States, it is a valuable resource book for every teacher. The conceptual outline provided in this Handbook draws heavily upon this particular publication.

HEALTH FOR ALL, W.J. Gage and Company, 1500 Birchmount Road, Scarborough, Ontario.

A kindergarten through grade eight text book series which can be useful as a source of reference materials.

HEALTH AND GROWTH, W.J. Gage and Company, 1500 Birchmount Road, Scarborough, Ontario.

A recent (1971) textbook series which provides excellent visual material and current, comprehensive coverage of all aspects of the health program. A class set of the HEALTH AND GROWTH program would be most useful for student and teacher reference.

Materials on a variety of topics are available from:

FEDERAL DEPARTMENT OF HEALTH AND WELFARE, Ottawa, Ontario.
ST. JOHN AMBULANCE SOCIETY, 10055, 110 Street, Edmonton, Alberta.
CANADIAN RED CROSS SOCIETY, Alberta - N.W.T. Division, 1504 1st Street, S.E., Calgary 21, Alberta.
NORTHERN HEALTH SERVICE.
EDUCATIONAL RESOURCE CENTRE, Yellowknife, N.W.T.

KINDERGARTEN

These outline notes are based upon thinking about 'what should take place' in pre-school education programs within the Northwest Territories, and reflect current thoughts and concerns in this area. The major concern of pre-school education is planning for each child's optimum development through a program of experiences in living and learning, which is based upon and extended from his first years of life within the family and the community.

During the year 1972-73 it is intended to develop these notes further, with a view to producing a comprehensive, well-illustrated booklet which will contain information, observations, and policies regarding pre-school education in the Northwest Territories. It is hoped that topics such as: Aims and objectives, Parental participation, Child development, Theories of play, Buildings and equipment, Organization of environment, Guidance, and Program planning, etc., can be discussed in detail.

SOME PLANNING CONSIDERATIONS

When a group of parents, through their Local Education Advisory Board, Settlement Council, Education Personnel, or other community agencies, perceive a need and express a desire for the implementation of a programme of pre-school education, certain basic planning procedures should be instituted:

a) In order to prevent the three major pitfalls commonly encountered in pre-school programs, i.e. the creation of a baby-minding agency; the mere downward extension of the current school program; and the superimposing of an ineffective and culturally inappropriate program; a program of 'parent education' should be instituted so that the adults of a community may gain an insight into the many different types and possibilities of pre-school education.

b) Informing the community of present programs and of possible choices is essential to provide a basic frame of reference on which a program appropriate to the pre-school needs and reflecting something of the aspirations of the community, can be evolved. E.g. Through the use of films, guest speakers, pictorial booklets, the demonstration of equipment and techniques - showing various types of pre-school programs around the world, with specific reference to those being used in cross/intercultural situations: the U.S.A. Headstart Programs; the Montessori Method in India; Froebel schools in Germany; Nursery schools in England; Play-groups in Australia; Ecole Maternell in France; a Danish Bornehaver; an Academically-oriented kindergarten; plus video-tapes of established pre-school programs in the Northwest Territories; and other Circumpolar Regions.

   E.g. Through community or other sponsorship, opportunity for groups of parents to visit various types of pre-school operations both in and outside of the Northwest Territories.

c) With a frame of reference and with a body of informed opinion in the community, the various agencies involved may request the appointment of a Co-ordinator through whom they may advise wisely on the evolving of an appropriate pre-school program; i.e., one which they feel contains the essentials for the growth and needs of their children, one which they feel is situationally relevant, and one which they feel they can support.

d) The pre-school programme should be conducted on a co-operative basis, by the co-ordinator, several full-time teacher-aides, plus a number of ancillary helpers - possibly mothers employed on a contract basis by a Settlement Council or by the Education Department or possibly a group of women volunteering to work on a rota-basis.

e) Within such a framework of communication, confidence, and co-operation, research and exchanges may be commenced re: the lifestyles, child-rearing practices, motivational and disciplinary approaches commonly used by the community; the expectations of the adults re: their young children, child health patterns, the psycho-socio-economic interactions of community groups, and intensive observations made of the young child's activities prior to entering a pre-school programme; with the objective of providing a sound operational basis for a pre-school programme.

f) The pre-school building and its design should reflect the needs of the young child, providing a clean, safe, spacious, and comfortable environment - with adequate provision for physical activities. A suitable building could be constructed by the community using pre-fabricated materials, geodesic domes, or module units and must be located on a site which is central to the homes of the children. Climatic conditions should receive considerable attention in the building design; e.g., due to a long period of winter darkness, it would be necessary to provide a large indoor area for physical activity; similarly long periods of daylight may require that a system of air-conditioning is installed.

Health and socio-economic considerations may require that dining and sleeping facilities are provided, showers or bathing facilities, and a medical room.

Such a building should be flexible in its uses - adult Education, Youth Club Activities, etc.

The funding and constructional operations involved could be an interdepartmental one with appropriate N.W.T. Government agencies participating and contributing, together with other agencies, e.g., Northern Health Services.

Pre-School Programs Are Based Upon, And Concerned With:

1. Determining the needs of the pre-school child.
2. Developing programs appropriate to children between the ages of two and six years of age according to the pre-determined needs.
3. The aims and aspirations of a community in relation to its young children.

4. Providing a clean, safe, spacious, and comfortable building, with appropriate facilities and furniture; an attractive and stimulating environment
5. Balancing the emphasis in all aspects of development and giving equal considerations to all needs:
   a) Providing space, opportunity, and equipment for physical activities, exploration, movement, and dramatic activity.
   b) Providing a wide variety of experiences; promoting creative and constructive expression; wise utilization of the young child's natural curiosity.
   c) Developing the child's interests, abilities, and his enjoyment through satisfying learning experiences.
   d) Guidance which is culturally accordant and educationally appropriate throughout all activities, in behavioral considerations, in social situations and interactions, and in the development of emotional stability.
6. Promoting parent participation and co-operation; assisting both the child and his parents to adjust to the pre-school program.
7. The development of unique programs which are appropriate to local circumstances and situations:
   a) Suitable hours of operation in conjunction with other concerns; industrial development, seasonal activity, health and welfare, the full-time employment of mothers outside the home, etc.
   b) Seasonal sessions which take into consideration items in 7(a), plus the limitations of the building and the natural activities of the child.
8. Offering a rich experience which is initially based upon an extension of the child's home, and which will extend into the first three years of schooling. An environment which will help to promote the development of each child to his maximum potential in relation to his age, abilities and needs.
9. Records - setting up and maintaining comprehensive records of relevant information and observation on each child. Logbook of daily events, unusual happenings, visitors, etc.
10. Providing teaching which is of a quality commensurate with the tremendous responsibilities of pre-school education.

BASIC ACTIVITIES FOR PRE-SCHOOL PROGRAMS

Physical and Health Education:

This is the core of pre-school programs - essential for growth and development as well stimulating for exploration and experiment. Apparatus for both indoor and outdoor activities: - Jungle gym, climbing ladders, swings, slides, climbing ropes, rope ladder, commando net, crates of assorted sizes, planks and building boards, wooden barrels, sawhorses, small boat or canoe, sleds, rocking boat, rocking-horse, platforms of assorted shapes and heights, A-frame apparatus - tubular steel, with circular bar, wooden beam, steel ladder, etc. Trampoline - child's size. Wheels - tricycles, scooters, wagons, cars, skidoo, wheelbarrows, aeroplane, baby-buggies, tires, wheel-sets for attaching to planks, circular 'saucer-cart', animals mounted on wheels, trucks, engines, etc. Inflatables - animal shapes, tunnels, chairs, mazes, etc. Tumbling mats, stair-sets, balls, hoops, ropes, bean-bags assorted sizes, bouncing-board, hollow-blocks.

Facilities such as a drinking fountain, showers, kitchenette for providing a Swedish breakfast, towels and toilet supplies for each child. Appropriate footwear.

Safety training.

Block Building:

Assorted shapes and sizes - polished wood. Several sets of various types - good variety. Storage cabinets essential plus adequate space for building area.

Accessories - miniature cars, trains, animals, aeroplanes, Dinky toys, Matchbox models, people, etc. Durable storage trays/containers for accessories.

Constructional Apparatus:

'Connector', 'Junior Engineer', 'American Logs', etc. may be used as extensions of block-building.

Sand, Water, and Soil:

Whenever possible, a sand-pit, a wading-pool, and a soil trough should be incorporated into the initial design of the building, with both indoor and outdoor facilities being provided.

Various commercial sand-trays, water wagons, and gardening boxes are available - metal, wood, plastic, wheeled, etc. Care should be taken to ensure that any model is large enough for the activities of a group of children; that the sand and soil containers are suitable for adding water; that the water pool is adequate for wading, and that each container is designed for effective cleansing procedures. Accessories: - plastic bottles, dishpans, tubing, sieves, collanders, scoops and spades, jelly-moulds, funnels, sponges, corks, trowels and forks, cans, watering-cans, sprays, pails of assorted sizes, cookie-cutters; miniature vehicles - land, water, air, people, animals, etc. Food colouring for water. Seeds, plants, twigs, for observing growth, Plastic cover-alls should be provided. Accessories for elemental activities should be stored on low shelves or plastic trays placed close to the activity centres.

Woodwork:

A woodwork bench is needed which has been adjusted to child-height and fitted with clamps/vice, etc. Tools - hammers, screwdrivers, pliers, crosscut saws, metal tape-measures, files, sand/glass paper, felt-pens, at least one hammer per child, assorted sizes. Maintenance of equipment is essential. Heavy-duty glue, scraps of leather, sail cloth, gloss paint and paint remover, pieces of chain, etc. Containers, pieces of soft wood - assorted shapes, sizes and thickness, balsa wood, cotton spools - sawn in half to make wheels, pieces of dowelling rod, toothpicks, tongue depressors, styrofoam, pieces of cork, pegboard and insulation board. Nails and screws - assorted sizes.

Painting:

Easels - metal, double-side, sturdy. Brushes, semi-stiff, 1" flats, assorted sizes circular. Coveralls, adequate coverage of clothing, plastic. Clothes drying-rack useful for drying paintings. Paint - tempera mixed to thick consistency. Paint should be presented and mixed in clear plastic containers and be placed in sets on a suitable table close to each easel, or between a pair of easels. Paper - large sheets of good quality sugar-paper 20/24". Sugar-paper is ideal for extending the media i.e. for use with pastels, chalks, charcoal, felt pens, crayon, and ink.

Floor-painting - spread a long piece of lino-cloth on the floor. Keep paint containers in storage trays. Plastic dishpan containing damp sponge or cloth should be placed close to paint activities. Other accessories; toothbrushes, small sponges, combs, straws, string, stippling brushes, feathers, etc. Charcoal fixative, household varnish and spray paints.

Finger-painting - using either floor space or low tables. Paper - non-waxed, white butcher-paper, approximately 12/18". Finger paint may be purchased commercially or made with a mixture of flour, salt, and water with food-colouring added. Finger paint should be presented in plastic bowls placed in the centre of the area. Water bowl, sponges, paper towels and garbage can should be easily accessible.

Drawing activities - low tables and chairs. Cartridge paper cream coloured, assorted sized pieces. Pencils - sharpened, hexagonal with B-lead or similar thickness. Pencil crayons assorted colours. Crayons - wax, assorted sizes, colours sharpened. (Note - using stubs of pencils and crayons etc. causes tension and muscle cramps in the hand muscles). Charcoal, pastels, etc. may be used on cartridge paper.

Reference Book: - "What Children Scribble and Why". Rhoda Kellogg: (San Francisco. 1955).

For painting of wood, clay, and scrap models, gloss, poster and ceramic paint should be provided.

Collage and Scraps:

Adequate table space with chairs. Paste and glue in small container, brushes and scissors for each child. Stapler, paper punch, paper clips, scotch-tape. Shallow trays, wire baskets, clear plastic boxes for materials placed centrally on work-area. Large containers for spools, cans, boxes, etc. Materials - lace, fabrics, ribbons, trimmings, felt, leather, fur, coloured string, textured papers, corrugated card, sand paper, velvetized, flocked and patterned papers, tiles, bricks, flowers, etc. All materials should be in small sized pieces, and a variety provided. An iron and pinking shears are useful for preparing materials. Paper for collage - heavy construction paper in a variety of colours, approximately 9/12" or 12/18".

Construction with scraps requires large area for sorting, displaying and manipulating objects. Glue must be strong enough to hold models. A wide variety of materials should be provided - styrofoam, domestic packaging, wire, string, wood, paper, metal, plastic containers, etc.

Small accessories, e.g. beads, sequins, buttons, tassels, jewels, should be stored centrally in clear plastic containers.

Clay Modelling:

Table space and chairs. Arborite table-top or other washable surface, lino-cloth, etc. Modelling boards, floor tiles, metal trays and small potters wheels. Clay should be of a good consistency stored in a central bin for presentation to children. Provide pieces size of a grapefruit in a plastic bag. Extra clay may be placed in plastic bowl covered with a damp cloth in centre of table. Ceramic and preconstituted clays are recommended. Tools are not required for young children. Locate near paint and scrap areas for stimulation to extend models with other materials.

Sound Exploration:

A low, pegged rack with suitable shelving for displaying and storing percussion and stringed instruments. Good quality instruments, orchestral ones where possible, including different toned drums, cymbals, glockenspiel, xylophones, chime bars, Chinese bells, zither, flutes, rattles or maracas, triangles, castanets, gong, Indian bells, autoharp, piano, whistles, metronome, guitar, ukelele, music-box and concertina. Appropriate mallets, drumsticks and plectrums. Tape recorder and Listening-post set as well as record player with collection of appropriate records.

For experimentation with sound by teacher/child, child/child, or in group activities - creating sounds with drums made from grape barrels, fiddles from cigar boxes, all types of shakers out of cans filled with beans, nails, pingpong ball, etc. - bunches of chains, keys, nails or bolts for jangling. - jars/bottles with varied water levels for tapping.

Science Interests:[

A set of wide, low shelves or an open-style storage cabinet together with experiment table and display board. Cumulative file of natural science pictures. Thermometers, weighing scales, magnets, locks and keys, nuts and bolts, measures, mirrors, siphon, etc. Aquarium, terrarium, insect box, wormery, bird-cage and a mouse-house (note: gerbils, goldfish, turtles, worms and spiders are easy to accommodate indoors). Plants, gardening trough, cuttings, seeds, etc. Vegetables, flowering plants, small bushes, grasses, mosses, twigs, leaves, and berries and fruits. Sea-shells, fossils, collection of rocks, fur samples, hides, feathers, bones, teeth, nests, etc. Mechanics box containing old clocks, switches, old radios, engine parts, wires, telephones, etc. Periscope, kaleidoscopes, smoked/coloured glasses.

Play-House Activities:

Child-sized furniture - table, chairs, rocking chair, stove, fridge, cupboards, sink unit, beds, cradle, set of drawers, iron and ironing board, baby-buggy, sets of aluminum pots, pans and cutlery, broom, mop, dusters, tablecloths, bedclothes, dishpan, mirror, telephone, alarm clock, towels, garbage can, clean durable dolls of assorted sizes, simple doll-clothes, miniature sewing machine, newspapers, magazines and catalogues, drapes, cushions, clothes cupboard and hangers.

Dough made daily and kept in plastic containers, flour shaker, rolling pins, muffin tins, bread tins, cake tins, cookie cutters, jelly moulds, pastry-edgers, food colouring.

Dressing-up clothes - in clothes cupboard or on a low rack with shelves for accessories. Cut-down clothing - shirts, jackets, dresses. Costumes of story-book characters, traditional costumes, hats, gloves, scarves, veils, beads, jewellery, belts, badges, neckties, purses, capes, aprons, cowboy hats, military style caps, helmets, goggles. (All clothing should be easy to fasten and washed regularly.)

Small Apparatus:

Sets of manipulative apparatus, stacking toys, shapes, sets/boards, simple puzzles, kindercity, miniature farm, zoo animals, vehicles, people: constructional apparatus such as 'Cubal', 'Zusa', 'Lego', inter-locking bricks, 'Tinker-Toy', dollhouse and furniture, parquetry and mosaic blocks, dominoes, Lotto, individual flat-boards and assorted shapes, magnetic puzzles, 'Merripeg" sets, clockwork models, beads and laces, Mattel and Matchbox models, pattern boards, cogwheel sets, lacing toys, abacus, peg-boards, geometric shapes boards, balancing sets - acrobats, etc., inter-locking shapes, cubes, tower building, simple games. Trays, baskets, containers for apparatus. Selection of apparatus. Selection of apparatus made daily from choices arranged on low, blanket-covered tables with extra material on nearby shelves.

Library Activities:

Adequate bookshelves with easy access to books; large enough for children to replace books without damaging them; books displayed up-right so that the covers may be seen. Magazine rack. Table and chairs, carpet, cushions, stools. Good lighting. Picture books, scrap books, postcard albums, photo-albums, story books, collections of pictures held by file-rings. (Note - illustrations should be large and clear; fantasy and reality in subject matter; good quality hard-cover books). Use of library services if available. Subscription to Early-to-Read Books and Dr. Seuss. Books which have universal appeal to children around the world. Use in conjunction with records, film-strips, films, appropriate objects, dramatization. Young children should hear at least one enjoy-able story each day.

Mathematics:

Unless a specific structural programme is being used, e.g. Cuisenaire, Stern, Hachette, Unifix, etc., the apparatus and environment of the pre-school unit will provide a wealth of mathematical experience, which can be developed by the teacher into consolidating projects, extended and enriched by direct guidance, and by indirect introduction of environmental materials and situations.

Summary

A good pre-school program is one which reflects most completely the highest values of the surrounding society; offers 'adequacy plus' at every stage of development; and is concerned with the well-being of the child and his family.

At present there are four inter-related areas which need much exploration, consideration, and definition in relation to pre-school education, i.e. communication, legislation, long-term administrative planning and teacher-parent education, prior to the development of sound, appropriate, and co-ordinated programs for the young child in the Northwest Territories.

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Play, Dreams, and Imitation in Childhood, J. Piaget, Norton. 1951.

Education for a New World, M. Montessori. Theosophical Press. 1959.

Cybernetics, Norbert Weiner. Wiley and Co. 1948.

Learning Theory and Behavior, O.H. Mowrer. Wiley. 1960.

LANGUAGE ARTS

The Pupil	The Teacher	The Curriculum
1. Prior to entering school, the child has developed, used, and enjoyed his skills as a speaker of his language.	Must respect the dignity of the child's first language.	Must take advantage of what the student knows before he comes to the classroom.
2. Confidence in his listening speaking abilities has evolved with reference to his mother tongue.	Must understand that the second language is being added to the child's repertoire and is not replacing his first language.	Instruction in English as a second language must take advantage of the child's initiative and operational command of his language.
3. Has learned to classify and name in his language much of the world he has perceived.	Must realize that each language constitutes a special way of looking at the world and interpreting experience.	The knowledge that the child has gained must form the core of the language arts curriculum, being expanded and developed at all grade levels.
4. His perception of his world is influenced by the structure and lexicon of his language.	Must recognize that one sees and hears what the grammatical system of one's language has made one sensitive to and has trained one to look for in experience.	Must reflect the fact that no two languages are ever sufficiently similar to be considered as representing the same social reality. The worlds in which different societies live are distinct worlds, not merely the same worlds with different labels attached.
5. Potential learning growth is a function of his language process to a considerable degree.	Must view language as a tool of communication and not as a means of social classification or as a way to make people feel inferior.	Must avoid depositing the child in the no-man's land between cultures and between language groups.

LANGUAGE ARTS

– A FRAMEWORK –

The Language arts curriculum can pose the most difficult problems for the teacher in cross cultural education. The following introductory information is provided to assist in the resolution of these problems.

At the outset it has to be recognized that the North is a multi-lingual, multi-cultural society. (According to the 1971 Canadian census figures, approximately one half (49.8%) of the residents claimed a mother tongue other than English or French.)

In general, the languages may be sub-divided into the following families. The Athapaskan languages including:

Dogrib
Slave (y)
Chipewyan
Loucheux
Hareskin
Cree

The Eskimo language

The Euro-Canadian languages including:

English
French
Italian

Aspects of Northern Languages

Having identified the major languages it is necessary to examine certain of their characteristics. It is fundamental to recognize that within each language there are dialect differences. Or, to put it another way, the useage of any one language is not uniform throughout the North. For example, among three Dogrib communities such as Detah, Rae-Edzo and Lac La Martre there are dialect variations. Similarly, the Eskimo language can demonstrate differences between the eastern and western regions or between the "high" Arctic and the people living south of the Arctic Circle. From an English language view point one need only consider the regional variations in spoken English between the prairies and the Maritimes, or the west coast and Ontario. Similar situations with respect to other languages could be cited as well. Suffice it to say that because of the complexity of the language situation a considerable measure of responsibility rests with the school and the settlement to develop their approach to languages in terms of the needs and conditions of their community and its children.

A second aspect of Northern languages centres on the degree to which two or more languages have become integrated to the extent that a local functional language has developed. Possibly, the prime example, of this is found in the Mackenzie Delta area where English, Eskimo and Loucheux have become integrated to the point that a "Deltanese" language is recognizeable.

In other areas a similar process may have developed to a greater or lesser degree. The local languages of the people in the Great Bear Lake areas is a case in point. Similarly, the Dogrib and Chipewyan languages have combined to a limited degree in certain instances. Parallel developments in the English language provide ample evidence of the integration process whereby the phraseology and/or single words from one or more languages are readily incorporated into the dominant language.

A third aspect of profound concern is the extent to which certain languages are falling into disuse and are in danger of complete disappearance. The languages of the Mackenzie river valley are prime examples in this regard. Within this area, the Loucheux language has declined in useage and importance to a dangerous extent. A similar cause for concern can be found among the western Eskimo people particularly in those settlements including, and to the west of Cambridge Bay.

Another consideration is the written forms of Athapaskan and Eskimo languages. In a general sense the Athabaskan languages are employed almost exclusively in their oral forms with no written forms commonly employed. Only among the older people are some written forms of the language understood and used. In these instances either syllabics (Dogrib) or a Roman orthography (Loucheux) have some currency. The same situation does not generally prevail in terms of the Eskimo language. Primarily, syllabics is the vehicle whereby the people express themselves in a written form. In the Keewatin and much of the Baffin region syllabics have widespread use. In the Pond Inlet and some Arctic coastal areas orthographies which utilize the characters of the Roman alphabet are employed.

A final aspect to be considered at this point is quite obvious. The language by which you "Get Ahead" in the North is English. Whether you want an education, a job, mobility in terms of the larger Canadian society, or what-you-will, in the final analysis what happens to the individual will be almost soley dependent upon his competency in the English language. Certainly from a school point of view alone, the student's success or failure in terms of his education will rest almost entirely on his ability to master the English language.

The Educational Implications

Bi-Lingual Competency

There are at least two ways in which this question can be answered. A pragmatic answer is found in terms of what linguistic research has indicated with respect to the acquisition of languages. Assuming, for the moment, that consideration is being given to children whose mother tongue is other than English, research indicates that a child will acquire a second language in a more effective, efficient manner if instruction is first given in the mother tongue. For example, a Slavey child who has spent the first five years of his life in an almost exclusively Slavey-speaking environment will acquire the English language in a more effective manner if he is given the opportunity to learn initially in school in the Slavey language with concurrently, the English language being introduced gradually and specifically taught as a second language. The Slavey language, in this instance, would be used as the primary vehicle of instruction for the first three years of the child's education with English being taught as a second language in continuously increasing amounts of times so that by the time the child has been in school for approximately three years he would be receiving his education in roughly equal amounts of Slavey and English. From that point onward the amount of instruction in English would be proportionately increased while the amount of time devoted to Slavey would be decreased so that by the time the junior high years are reached the student is receiving his education in English and the Slavey language now reverts to the status of a language of study on a par with a subject such as French, for example.

In adopting this bi-lingual approach to learning any child can be given the opportunity to commence his formal learning experiences utilizing perhaps the most remarkable trait that a human being ever acquires namely his command of his language. Concurrently, the second language (English) can be introduced and over a period of three years can become the language of instruction while the mother tongue remains as a valuable part of the total school program as a language for further study. In this manner everything that the child has learned in terms of his first language prior to entering school (the sounds, the grammar, the basic vocabulary, his concept of his world) becomes the foundation upon which his school learning experiences are constructed. The end result will be a student who feels comfortable and competent in the dominant English language but who, at the same time, has retained his competency and pride in his mother tongue.

Humanistic Concern

Another way in which the question of educational implications might be answered could be called the "humanistic" approach. The basic concern in this instance is whether or not anyone or any agency has the right to deny people the use of their own language. Has Euro-Canadian society the right to say to the Athapaskan and Eskimo peoples, "Look, if you want to make it in my world you have to do it my way and this means you have to give up your language, and in large measure your culture since the two items are inseparable." Within the pluralistic Canadian society there is a glaring necessity to re-orient the educational system to recognize and to establish language and cultural learning programs in all schools. In this manner the multi-lingual, multi-cultural strength of Canada will be enhanced in the minds of all people. The incorporation of language programs into the schools will do much to focus attention on "people" - and that is what this is all about.

MAKING A START - THE CHILD

It must be recognized that in a typical, conventional classroom the learning process can be almost totaly dependent upon the child's ability to comprehend the spoken word and its supplementary component, the written word. Not only does the child have to listen and to comprehend but also he very likely has to give some response which will indicate that he has understood what is being expected of him. It is DESPERATELY IMPORTANT that every teacher be capable of performing a DIAGNOSTIC function with regard to the language strengths of the individual child. To assist the teacher in making this essential diagnosis it is perhaps useful to think of the language development of any child in terms of a continuum similar to the following, using the Eskimo language as an example.

Language Continuum

First Lang.	Second Lang.	Early Grades	Later Elem.	Junior High	Target Language to be acquired or developed.
Eskimo		Eskimo (strong)	Eskimo (weak)	Eskimo (weak)	Eskimo - sustained (strong)
	English	English (weak)	English (weak)	English (strong)	English - developed (strong)

Notes on the Language Continuum:

a) This continuum, if taken at face value, tends to over-simplify a very complex situation. There are significant variations in any one developmental stage in a child's language growth. For example, many children whose first language is other than English will come to school knowing predominately their mother tongue but will, concurrently, have acquired a minor grasp of English. In other words, a child may come to school virtually, but not completely monolingual.

b) The mistake is commonly made that a child whose first language is not English and who comes to school speaking English with a limited vocabulary is ready for complete immersion into the English language. For example, a Loucheux child has likely spent the pre-school years in an environment which made it possible for him to acquire some command of English. However, at the same time it is probable that within his home he has been exposed to some Loucheux as well, to the point where he has a limited bi-lingual competency. Parallel examples can be cited with respect to Chipewyan, Slavey, Hareskin, and western Arctic Eskimo people, in particular.

c) Children of all age and grade levels in the Northern schools are at various stages in terms of their growth and development in English as a second language. The **ASSUMPTION CANNOT BE MADE** that because an individual student has been in school for "x" number of years he is in full command of the English language. The end result is that the pupil simply gives up the struggle for an education that is exclusively presented to him in a language he does not fully understand.

d) The first language skills acquired by the child prior to school entry are those of listening and speaking. Skills of reading and writing in the first language have not been acquired in most instances.

e) The Euro-Canadian child who comes to school with a reasonable command of his language is obviously at a distinct advantage in terms of benefiting by the English oriented learning program. However, even in this instance the teacher should carefully consider the possible influence of environmental factors on the child's language growth. If the child was born and raised in a Northern settlement and has lived much of his life in the one community it is possible that his "world view" is narrow to the point that considerable effort will have to be made in terms of expanding his experiential background. It must be constantly remembered that an individual's competency in language is, in part, dependent upon the environment he has experienced. In a real sense, "I can talk about what I know, what I have seen, what I have done." A gross injustice will be done to this type of child if the teacher concludes that because he can speak English he is therefore on a par with his "southern" counterpart who has lived in an urban environment characterized by all of the amenities of a sophisticated and complex society. The influence of television alone, particularly programs like Sesame Street, provide a language experience that is not available to most Northern children, regardless of their ethnic origin.

f) The objective of Northern language teaching is to make it possible for every student to become competent in English as a first language (if he happens to be Euro-Canadian), or English as a second language (if he is Athabaskan or Eskimo). Concurrently, for the child whose first language is not English the school program must make it possible for command of that language to be further refined and enhanced within the formal school program. In this respect the aim is to make it possible for the individual to become fully bilingual.

MAKING A START - THE TEACHER

Diagnosing the language strengths of the children is a demanding, time consuming responsibility. If the language arts program can be construed in terms of the "foundation" upon which much of the subsequent "educational building" will be based perhaps teachers will realize that "TIME IS NOT YOUR ENEMY". There is no compulsion to cover a prescribed syllabus, curriculum, text book, or any other laid down program in an arbitrary period of time such as a 10 months school year, for example. The process of introducing English as a second language has to be a gradual one that is receptive to the needs of every child. What now follows is a plan of attack that may help the teacher in devising his own personal approach.

Contrastive Analysis

At the conclusion of this language arts section will be found Contrastive Analysis information on various Northern languages. Read through this information at the earliest opportunity. From this research, even with quick, superficial reading, you will be able to appreciate the difficulties that a child, whose first language is not English, may have in trying to acquire English as a second language. For example, take note of the sounds that are used in the mother tongue but which have no equivalent in English. Look at the variation in sentence structure. How do the grammar systems compare? What parts of speech are commonly employed in

English, but not in the first language? Examine the expressions that have wide currency in English but which are absent in the mother tongue. Later on as your language arts program develops you will be able to refer repeatedly to this information as an aid in helping to identify problems that the students may be experiencing.

Research

You will have to do some personal research on your own to help you to establish the language strengths of the children you are teaching. Some sources that may be of immediate help to you are: the principal and experienced teachers, comulative records, samples of the child's work from preceeding years in school, the teaching assistant (s), school advisory committee members, local people (priest, minister, longtime community residents). Capitalize on the knowledge of settlement people to the fullest degree.

Diagnosis

Assuming that a "rough" picture has been obtained the next step is the most important, namely diagnosing the language strengths of each child with whom you shall be working. Your concern is with the relative strengths of the child's first and second languages, as appropriate. Consideration must be given to all of the language skills; listening, speaking, reading and writing. The assumption cannot be made that because the student has been in school for a few years that it is only the "reading" skill that is deficient. REGARDLESS OF AGE LEVEL all skills should be diagnosed. This diagnosis is best carried on by the use of uncomplicated teacher prepared tests. These may be in the form of 1.) listening tests, as these can be prerecorded on a cassette; 2.) oral interviews with each child; 3.) simple assignments whereby the child is expected to carry out instructions given in English; 4.) an assignment whereby the individual has to transpose a concept or generalization provided by the teacher into his own words; 5.) reading and writing skill tests. It is important that the teacher make this diagnosis as intensive as possible. Otherwise, there is the inherent danger that the conclusion will be reached that the child comprehends more/less than is in fact the case. Moreover, the emphasis must be on WHAT THE CHILD UNDERSTANDS. Frequently, it can occur that "parrot-like" repetition is accepted as being indicative of understanding.

Time

Depending upon what has been ascertained with respect to the language strengths, a "time table" for daily instruction may now be outlined. For guidance in this regard the following possible approach is mentioned.

Year One	90% of the program carried on in the mother tongue. 10% of the time devoted to teaching English as a second language.
Year Two	80% of the program carried on in the mother tongue. 20% of the time devoted to teaching English as a second language.

Year Three	60% of the program carried on in the mother tongue. 40% of the time devoted to teaching in and the teaching of English as a second language.
Year Four	50% of the program carried on in the mother tongue. 50% of the time devoted to teaching in, and the teaching of, English as a second language.
Year Five	40% of the program carried on in the mother tongue. 60% of the time devoted to teaching in, and the teaching of, English as a second language.
Year Six	20% of the program carried on in the mother tongue. 80% of the time devoted to teaching in, and the teaching of, English as a second language.
Year Seven	10% of the time now spent in studying the mother tongue as a language. 90% of the time the instructional program is in English with a portion of that time being used to teach the skills of English as a second language.
Jr.-Sr. High Years	The instructional program is conducted in English but provision is made for the study of the mother tongue.

Comments on the Above

This is a sample approach only but it does indicate the relative emphasis to be given to first and second languages at various stages in the school life of the individual.

Until approximately the end of the child's second year in school he should receive instruction in the various subject areas in his mother tongue. By the time the child has been in school for three years he should be capable of receiving instruction in his mother tongue for the majority of the time and in English for some of the time. By the fourth year the child should be in a bi-lingual position whereby he can be taught in both languages for roughly similar amounts of time. From the fourth year onward the language of instruction progressively becomes centered on the English language while the mother tongue gradually assumes the position of a language of study.

The emphasis at this point in time is on establishing effective programs at the year one and two levels. In a number of schools it is at the kindergarten and grade one years where the major concentration must be applied. In subsequent years the program can be extended on a systematic basis through to the junior high levels.

Emphasis

Utilizing the foregoing information as a guide, the teacher can look at the practicalities of his own situation. How much emphasis on first and second languages must be given? Is a teaching assistant available to instruct in the mother tongue? If a teaching assistant is not available is there someone in the community who can be hired on "contract" to assist in instruction in the mother tongue? Is there an older student in the school who might work with the teacher who is involved with the younger children? What about securing the services of a bi-lingual high school student, if only on a part time basis? Because at the present time the supply of teaching assistants is inadequate to meet the classroom needs, every avenue should be explored to ensure that students who need language help have that assistance made available to them. Otherwise the educational program may run the risk of being virtually incomprehensible to the very pupils it is supposed to serve.

MAKING A START - THE PROGRAM

It has been estimated that before a child can begin to learn to read he needs an ORAL VOCABULARY of between 4,000 and 6,000 words. For this reason the initial emphasis in language arts for ALL children must be in terms of developing listening and oral skills. Sometimes it can happen that children are introduced to the world of print well in advance of their readiness to cope with this type of material. With the importance of aural-oral skills recognized, aspects of the program can now be tackled.

Team Teaching

In those classrooms where a language other than English is to be used as the primary medium of instruction a team teaching approach must be established incorporating the talents of the teacher and the teaching assistant. Weekly, if not daily planning will be required. The teacher will decide on the nature of the program: the skills to be taught; the concepts to be mastered; the methodology to be used; the materials which will be needed; the time allotments to be made available. Depending upon the extent to which the mother tongue can be utilized, the teaching assistant will present the directions to the children in the language they can understand; put the concepts into the appropriate language; answer questions as these may be raised by the children in their language; and in general act as a "teacher-interpreter" for all aspects of the program under the guidance of the teacher. With respect to the English as a second language part of the daily program the teacher will provide the instruction but will require the help of the teaching assistant to make sure that the material presented is understood by the pupils.

Activities

In order to build-up the experiential background of the children the total program particularly at the early age levels, must reflect an activity-centered learning environment. Children must have the opportunity to touch, handle, manipulate, and, in general, totally involve themselves with their learning environment. This type of vicarious experience must be extended beyond the classroom walls to the settlement and immediate surroundings in order that the child may have the chance to expand his range of experiences and at the same time acquire the information upon which his future vocabulary development can be based. "The child needs things to talk about."

Listening Skills

Part and parcel with the activity-centered program is the listening skill development program. It may take the form of story telling in the mother tongue; it may involve frequent use of recorded material either on tape or records; the reading of poetry, children's literature and the like is most beneficial; puppet theatre; simple classroom dramas; listening for sounds while on a field trip, exploring the sounds of the community are some ways in which the development of listening skills might be approached. Probably the most important aspect of the listening skills program to be considered is that development in this area is continuous. Throughout the first seven years of schooling continuing emphasis on this skill must be a part of the language arts program.

Non-Verbal

Keep in mind that although the child may have difficulty in grasping concepts in any language this does not necessarily mean that learning cannot take place. Non-verbal communication can and should be used to bridge the gap. If a child cannot communicate what he has learned via the spoken or written word he might be able to express himself through art, arts and crafts, arts and technologies, or other similar methods whereby the individual is actively engaged in trying to express himself. Similarily, a science concept is likely more wisely presented through simple experimentation which gives the child the chance to do something other than merely relying upon verbal communication means. The same approach can be taken in mathematics, social studies and, indeed, all of the various areas of learning. The learning process need not be stifled because there is a lack of language abilities. The key is to find other approaches which will permit learning to go on rather than allow the child to become frustrated because of language difficulties.

Repetition

When verbally developing a concept in the child's second language (English) do so slowly, and systematically, each step logically following the other without any skips or reverting back to some noncontiguous previous step. Don't be afraid to repeat a statement. In Athapaskan and Eskimo languages development of a theme or thought can be generally slower than in English thought development, often with much repetition, i.e. making a statement, then restating the same idea in a different sentence pattern. When the teacher does repeat a statement it is important to use essentially the same words. Avoid the use of synonyms as these may introduce confusion in the minds of the children.

Referents

The use of indefinite referents such as "it", "he", "she", (these are not distinguishable in Athabaskan and Eskimo), "that", "this", etc. should be considered carefully when using English as the instructional medium. Both Athapaskan and Eskimo referents are more precise than in English and therefore communication can be lost because of the foreigness and vagueness of English indefinite referents.

Changing The Focus

While developing a concept in English, if one must shift the focus, clue the children to the fact. Don't proceed to the new theme (even though it may be related), without alerting your listeners to what you are doing. If one jumps rapidly from one subject to another, particularly when asking questions, the listener may have difficulty in following the communication. When introducing an illustration, use a pat formula to alert the students such as "This (theme) is like..." "The Athapaskan and Eskimo languages have a precise sentence mold for illustrations, and thus the listeners are explicitly alerted to the shift into an illustration.

Literal Reference

In using English, be as literal as possible. When there is no parallel word in the mother tongue it is easy to mistake the meaning. Abstract principles should be related to concrete applications by making abstract words and abstract concepts more meaningful through dramatization and through the use of visual aids. The Athapaskan and Eskimo languages lack a history of philosophical speculation which permits a high level of abstraction. There are no equivalents for abstract words like principle, experience, conscience, culture, government, energy, social studies, etc. You cannot assume that your students have a clear definition of such words so the more literal one can keep the message, the better.

Idioms

English is rich in idioms. English speaking people can hardly utter a sentence without using an idiom or a word with a derived meaning. Idioms are virtually nonexistent in the mother tongues of Northern peoples so their languages are predominantly literal. For this reason it is most important to beware of idiomatic expression, particularly when trying to convey a concept. The listener will likely be more than a little confused if he is confronted by statements like: "how's it going"; "cut it out"; "I'm stumped"; "go ahead"; "look out"; "get at it'; "that's tough"; etc.

Cultural Patterns

Be alert to cultural/geographical limitations and cultural patterns. An understanding of the former is useful when background information is necessary for communication and the latter will provide illustrative material to make your lesson presentations more meaningful. The objectives and content of each lesson should be assessed with the ongoing life in the settlement. It identifies on the one hand, facts that can be used as illustrations and on the other, the specific gaps which need reinforcement beyond what the regular school program provides.

Summary

The following suggestions may seem trite and very obvious, but are often overlooked.

Use simple effective words when employing English as a second language.

Use simple English sentences. Complex sentences having many clauses are often confusing. Equally confusing are disconnected sentences.

Cultivate the habit of speaking slowly and precisely. Become conscious of slurred speech and personal dialect peculiarities.

Though both Eskimo and Athapaskan languages have passive voice, the active voice keeps subject and object in sharper focus and is thus more effective.

Both Eskimo and Athapsakan are languages in which the verb is extremely important, more so than in English. Refer to Contrastive Analysis information on this point.

MAKING A START - SOME SUGGESTIONS

1. To teach a language is to impart a new system of complex habits and habits are acquired slowly.
2. English should be taught as it is, not as it ought to be. If contractions are the accepted standard informal conversation then they should be taught for use in informal conversation among the children.
3. The general atmosphere in a second language lesson should be light-hearted and encouraging. Children should feel a sense of approval and accomplishment at the end of each lesson.
4. Keep conversation patterns relevant to the children's everyday life. Topics and situations should be familiar and significant to the people who are talking about them.
5. Besides the regular planned lessons, any special occasion as it arises should be seized upon to introduce new and significant vocabulary suitable for the children's stage of development. The visit of a parent or some community activity of interest can be well used for language motivation.
6. In eliciting oral response from children start with the whole group then have a smaller group answer in unison and lastly ask individuals to reply only when they feel competent and confident.
7. Visual aids and "props" are very important in a Second Language class. They add meaning and interest to patterns being learned and improve understanding of difficult concepts like "under", "behind", "between," etc. Puppets or felt figures for flannel boards can motivate a story-teller or give needed confidence to a shy speaker.

A variety of devices in teaching oral English can be utilized to make the program more interesting and effective.

Pattern Practice is one way of teaching the correct sentence patterns so that their use can become automatic. In this method children respond by imitation and repetition to the sentence patterns of the new language. The teacher says the sentence, following a normal conversational pattern including natural tone and emphasis while the children respond in the same way. The material taught should be in a gradual, developmental sequence.

Substitution Drill. Once a pattern sentence has been taught, children can substitute other nouns while still using the same basic sentence. Substitution drills are effective not only for reinforcing the pattern learning but also for extending each child's use of the patterns already mastered. (N.B. Many pertinent "patterns" and "substitutions" suggestions are outlined in the New Let's Begin English books, at least one set of which is in each school.)

Dialogues involve two people and are interesting at any level of development. They can be used first in a simple question and answer procedure and develop as children progress in second language proficiency. Dialogues are useful not only for review of patterns and vocabulary but also for teaching new uses for patterns previously learned: e.g. Where are you going? I am going to the store. I am going with you. We are going home now.

Story-telling is always popular with children whether they do the listening or the telling and it can be useful in learning new patterns of language. A story told by the teacher with the use of a flannel board and "props" can motivate children to further oral participation. As the teacher tells the story they can supply in chorus a repetitive verse or individual children can supply suitable conversation for characters as they appear in the tale. As children become more proficient and confident they can tell a short story using the "props" they need. Different types of stories can be used effectively so long as they are of interest to the group of children using them. Legends and fables have particular appeal in this respect.

Puppets, Toys, Flannelgraphs, Pictures can be used to great advantage in second language teaching. There is an appeal to the imagination of the child in supplying animation and conversation to a make-believe third person that carries him beyond his own self-consciousness. These devices are suitable for different age groups and for varying stages of language proficiency.

Word Drill. As children progress in their understanding of a second language they need drill on various phonetics. In any new language there are sounds not used in the old one and drill in words using these sounds is a necessity. As an example, Athabaskan and Eskimo speaking people may have difficulty in distinguishing between the "p" and "b" sounds so would benefit by drill practice in words using these sounds. (A small mirror in which to watch the mechanics of making the sounds can be helpful and interesting for the speaker.)

Music, Songs, Rhythm games should be used as often as possible in teaching a second language. The rhythm and physical involvement characteristic of these approaches can give children a feeling of well-being and enjoyment that carries over to the actual oral language involved. Words of songs and singing games are learned easily to the accompaniment of records, rhythm bands and singing voices.

LANGUAGE ARTS MATERIALS

Series Titles	Publisher/Distributor
Arctic Readers	Curriculum Division, Yellowknife

Series Titles	Publisher/Distributor
Stories About Tendi	Curriculum Division, Yellowknife
Stories About Johnny	Curriculum Division, Yellowknife
Dogrib Legends	Curriculum Division, Yellowknife
Miami Linguistic Series (Grades 1-3)	D.C. Heath and Company
New Directions in English (Grades 1-8)	Fitzhenry and Whiteside
Language Patterns (Grades 1-3)	Holt, Rinehart and Winston

Individual Titles	Publisher/Distributor
(To be purchased in multiple copies)	
I Breathe a New Song (6.95)	(Simon and Schuster)
Beyond the High Hills (4.75)	Nelson, Foster & Scott
The White Archer (3.95)	Longman's
Tikta' Liktak (3.95)	Longman's
Wolf Run (3.95)	Longman's
Akavak (3.95)	Longman's
The Day Tuk Became a Hunter (3.95)	McClelland and Stewart
Shadows from the Singing House (5.20)	M.G. Hurtig
The Story of Comock the Eskimo (5.50)	Musson Book Co.
Pitseolak: Pictures out of my life (9.95)	Oxford Press
Harpoon of the Hunter (4.95)	McGill Queen's University Press
Eskimo Stories (3.00)	Information Canada
I am an Indian (5.95)	J.M. Dent
American Indian Tales and Legends (4.25)	Hamlyn Publishing
Alphabet Book (1.25)	University of Toronto Press
I am an Eskimo (4.75)	Alaska Northwest Publishing
Eagle Mask (3.95)	Longman's
Son of Raven/Son of Deer (4.90)	Gray's Publishing
Potlatch (6.25)	Gray's Publishing
Windigo (3.95)	McClelland and Stewart
How summer Came to Canada (3.95)	Oxford Press
Mountain Goats of Temlaham (3.95)	Oxford Press
Trapping is My Life (5.25)	Peter Martin Associates
Elik (5.95)	McClelland and Stewart

Individual Titles	Publisher/Distributor
The Raven (5.00)	McClelland and Stewart
The Wind Has Wings (6.75)	Oxford Press
Face of My People (3.00)	Eskimo Museum (Churchill)
More Glooscap Stories (4.95)	McClelland and Stewart

Recorded Material

The following L.P. records are available from the Record Club of Canada:

The Sesame Street Book & Record
Susan Sings songs from Sesame Street
Maurice Evans Reads Winnie-the-Pooh
Carl Sandburg's Poems for Children
Rootabaga Stories by Carl Sandburg
The Best of Ian and Sylvia
The Travellers, This Land
Tom Glazer Sings for and with Children
The Travellers, Applaud Canada
The Limlighters, Through Children's Eyes
Folk Songs for Young Folk
The Friendly Giant
Mr. Dress-up
Sally Go Round The Sun
Canadian Folk Songs
Gordon Lightfoot Sunday Concert
The Travellers, Still Travelling
Peter, Paul and Mommy
Oscar Brand's Children's Concert
Pete Seeger, Children's Concert

Pictorial Material

Royal Ontario Museum Wall Charts $3.00 each Charles Musson Co. Naskapi, Musical Instruments, Cree, Assiniboine

Indian-Eskimo Prints $6.00 National Sports Stories

Historical Prints 2 sets $5.00/set Confederation Life

Language Arts Charts for Native Children $6.75/set School Aids and Textbooks

One World Social Studies Program Discussion Pictures for Beginning Social Studies $63.00/set from Fitzhenry and Whiteside

Pictorial Material available from the Curriculum Division, Yellowknife - no cost Northern Games Charts, Nunaptinni and accompanying pictures

Newspapers and Periodicals

Item	Publisher/Distributor
News of the North (7.50)	News of the North, Yellowknife
Akwesasne Notes (5.00)	Akwesasne Notes, Rooseveltown, N.Y.

Kainai News (3.00)	Kainai News, Cardston, Alberta
The Native People (3.00)	The Native People, Edmonton, Alberta
The Beaver (4.00)	Hudson's Bay Co., Winnipeg, Man.
Tawow (4.00)	Department of Indian Affairs and Northern Development, Ottawa
North (3.00)	Department of Indian Affairs and Northern Development, Ottawa
Eskimo (free)	Eskimo Museum, Churchill, Man.

TEACHER RESOURCE MATERIALS

Teaching English as a Second Language, H.B. Allen McGraw-Hill Co., Ltd., Toronto 1965.

Indians of North America, H.E. Driver, University of Chicago Press, Chicago, 1969.

Teaching English as a Second Language, M. Finnocchiaro, Harper and Row, 1969.

I.T.A. in Primary Education, O.M. Gayford, I.T.A. Publishing Co., London, England, 1970.

Living and Learning, Hall and Lloyd Denis, Royal Commission Report on Ontario Education, Ontario Department of Education, Toronto, 1968.

How Children Fail, J. Holt, Dell Publishing Co., N.Y. 1964.

Language Teaching - A Scientific Approach, R. Lado, McGraw-Hill, Toronto.

The Teaching of English to Canadian Eskimos, B. Lewis, Unpublished Master's thesis, University of Toronto, 1970.

Teacher Program in English as a Second Language, N. MacPherson, Unpublished Master's thesis, University of Alberta, Edmonton, 1968.

The North American Indian - A Sourcebook, R. Owen, J. Deetz and A.D. Fisher, Macmillan and Co., N.Y. 1967.

"An Anatomy of Language Learning" W. Penfield, article published in Orbit, preliminary issue #1, Ontario Institute for Studies in Education, Toronto 1969.

Teaching as a Subversive Activity, N. Postmand and C. Weingartner, Delacorte Press N.Y. 1969

Salliq - an Eskimo Grammar, A.E. Spalding, Department of Indian Affairs, Ottawa, 1969.

Dictionary of English - Eskimo: Eskimo - English, A. Thebert, Canadian Research Centre for Anthropology, St. Paul University Ottawa, 1969.

Eskimo of the Canadian Arctic, Valentine and Valle, McClelland and Stewart, Toronto, 1968.

Kabloona and Eskimo, T. Vallee, Canadian Research Center for Anthropology, St. Paul University, Ottawa, 1967.

Miscellaneous Items

Miami Linguistic Teacher Handbook - D.C. Heath and Co.

New Directions in English Teacher Handbook - Harper and Row, 1969

Nuffield Math Project, "I do and I understand". - Longman's of Canada, Toronto

APPENDIX I

Phonetics Of The English Language

Many teachers assume that the use of English phonics, is adequate to teach English to Athapaskan and Eskimo children, whereas it is really only useful to teach English-speaking people the mechanics of their own language. It is not adequate to correct the various sound shifts articulated in the Athapaskan and Eskimo languages and can be helpful to second language learners only when they are well advanced in learning the new language.

This material is not meant to be followed implicity by grade or topic, but is merely a guide [illegible] the teacher who adapts the material to suit the needs of the children, keeping in mind the foregoing note.

One copy of a good phonics workbook is very handy for a teacher's use in finding suitable word lists or other pertinent examples. Phonics lessons should not be followed by lengthy, seatwork exercises. Short, frequent lessons involving listening, looking and speaking, with occasional testing, is most valuable.

Ages Five-Six

Initial Consonants - taught first through ear training. Children next learn to recognize and connect the visual and auditory symbol of each letter. These may be introduced as they are needed.

Final Consonants - introduce as needed in the reading vocabulary. Emphasize discrimination between first and last consonant sound; e.g., the m in "mother" and the "m" in "jam".

Consonant Diagraphs - that is "two consonants that make one sound"; e.g., sh, ch, th, wh. Teach also ng, ck, nk, as they appear.

Consonant Blends - bl, fl, pl, sl, br, cr, fr, etc.

Vowels - introduce first in initial position, i.e., and, in, up, on, end - then in one-syllable words, cat, fun, etc.

Rhyming - note rhyming elements in words. Introduce common endings through emphasis on auditory discrimination.

Structural Analysis

Endings - s, es, d, ed, ing. Teach how the meaning of the root word changes with the addition of these endings.

Compound words - made up of two known words; i.e., football, something.

Possessive - the addition of 's means ownership, Bob's father's.

Alphabet - Children should learn the names of the letters in random and consecutive order.

Initial Consonants - review systematically the sounds and corresponding names. Introduce soft g and c when they are needed; e.g., city, giant.

Final Consonants - introduce all final consonants.

Consonant Diagraphs - continue or introduce those listed in Grade 1.

Consonant Blends - formed by adding l, r, s, or w to other consonants - dr, gr, pr, tr, sl, gl; sc, sk, sm, sn, sp, st, sw; dw, tw; str, spr, scr, squ, spl.

Silent Letters - gn, igh, kn, wr.

Vowels - the names a, e, i, o, u and sometimes y. Teach long and short vowel sounds, e.g., hat, (short) and hate (long).

Vowel Diagraphs - two vowels that make one sound - ee, ai, ea, oa, ay.

Common Dipthongs - oy, oi, ew, ou, ow (now), oo (noon).

A single vowel when followed by r is controlled by the r, sometimes called "murmer dipthongs " - ar, er, ir, or, ur - eg., after,bird.

A silent e at the end of a word makes the preceeding vowel long; e.g., pin, pine.

When two vowels are together the long sound of the first is the sound of the two - e.g., boat, leaf.

Structural Analysis

Suffixes - continue as in Grade 1; er, est, y, ly.

Prefixes - introduce as they appear, unhappy, rewrite.

Alphabet - review names and teach alphabetical sequence.

Contractions - teach how they are formed - can't, isn't.

Possessives - ownership shown by the apostrophe and s, e.g., boy's hat, dog's bone.

Ages Seven-Eight

Consonants - initial, final and medial, e.g., (little); children need practice in hearing and identifying the position of consonants in any words; blends, e.g., sp str, etc.; and diagraphs, e.g., sh, ng, etc., and variant consonants qu, x (ks).

Vowels - the names, long and short sounds, diagraphs and dipthongs. Help the children to deduce and use the vowel rules.

Vowels and Consonants - discrimination between them; silent vowels and consonants - e.g., make, coat, listen, knit, write, talk, fight, mother.

Modification of Vowels

1. Sounds of single vowels when followed by r are controlled by the consonant. e.g., ar, or, er, ir, ur.
2. When a is followed by l, the sound is modified, e.g., call.
3. The letters l, n and r may be single sounds in a syllable, e.g., lit/tle, cot/ton, teach/er.
4. Extend the concept of hard and soft c and g; e.g., fancy, gypsy, giant.
5. Develop the concept that usually the number of syllables in a word is the same as the number of vowel sounds; e.g., cap, goat, ride, bea/ver.

Syllabication - Introduce the concept of syllables and teach the children to hear and see them in known words. A syllable is a part of a word in which a vowel sound can be heard.

Simple Syllabication Rules

When words are to be divided into syllables there are visual clues to be used.

1. between double consonants - yel/low
2. between two consonants - par/ty
3. after a vowel which is followed by a single consonant - to/ma/to
4. when the last syllable ends in "le" the consonant preceeding the "le" usually begins the last syllable - fa/ble
5. a vowel may stand alone as a syllable - a/round
6. the letters l, n, r may be single sounds - farm/er, hap/pen, fid/dle
7. blends and diagraphs are not usually divided

Structural Analysis

Compound or hyphenated words and contractions - Teach as they are needed. Emphasize the construction and meaning of the resulting words.

Suffixes - common endings change the meaning of foot words - ful, less, en, er, ion, ied, ly, tion, ish, able.

Prefixes - used to change the meaning of root words; un, de, be, ex, re, al.

Plural Forms - s and es; y to ies (cry, cries); f to v (knife, knives).

Possessive - teach the correct use of the apostrophe.

Dictionary - children need practice on position of letters in the alphabet.
- alphabetizing to the second letter.
- use of a picture dictionary.

Ages Nine-Ten-Eleven

Consonants

Review auditory and visual recognition of:

(a) consonant blends, br, tr, squ, etc.
(b) consonant diagraphs, ch, th, ph, etc.
(c) double medial consonants, bat, batted (i.e. before "ed")
(d) silent consonant - w, h, g, h, b, l, etc.

write
answer
knock
weigh
comb
ghost

Teach letter symbols as preparation for dictionary use -

(a) Regular consonant sounds are represented by the letters b, m, t, etc.
(b) Variant consonant sounds are represented by the following letter symbols.

scissors (z)
cent (s)
catch (k)
giant (j)
machine (sh)
echo (k)
box (ks)
xylophone (z)
queen (kw)
when (hw)
who (h)
measure (zh)
then (dh)
check (k)
ink (ngk)
phonics (f)
cough (f)

(c) Silent consonants, e.g., comb, debt, sword, answer, knot, wren, etc.

Vowels

Review long and short vowels, diagraphs, diphthongs, double letters and letter names.

(a) silent vowels - bone, bead.
(b) variant spellings of one vowel sound; e.g., a in gain, weight, great.
(c) unaccented vowel sound represented by schwa; ie., problem, April, lemon, circus.
(d) introduce simple diacritical marking of vowels found in a good dictionary.
(e) interpretation of vowel sounds as given in pronunciation keys of dictionaries and glossaries.
(f) vowel rules - know and apply rules for silent e ending, double letters and open and closed syllables.

Structural Analysis - Recognition, extension and use of:

1. Root words - cannot be further divided into meaningful elements. Definitions of root words should be used in looking for the meaning of derived forms, e.g., happy, so unhappy, happiness.

2. Prefixes - teach the term and the meaning and use of prefixes, e.g., re, fore, con, dis, in, trans, etc.

3. Suffixes - teach the term and the meaning and use of suffixes, e.g., ty, teen, ward, ish, ness, tion, er, or, etc.

4. Plurals - review and extend the use of s and es - words ending in y and f - unusual spellings, e.g., mice, geese.

5. Possessives - singular and plural, e.g., man's, men's, boy's, boys'.

6. Contractions - compound and hyphenated words, e.g., haven't, can't, goodby.

7. Stress the use of context for meaning and pronunciation of words; e.g., content, and content'.

Syllabication - Recognition, extension and use of syllables and accents in word attack.

1. Know and use simple syllabication rules as outlined in Grade III.
   - a) Teach Open and Closed syllables
     1. Open syllables end in a vowel; e.g., ta/ble, se/cret.
     2. Closed syllables end in a consonant; e.g., rab/bit, hid.
   - b) Compound syllables are usually divided between word parts and between syllables within the word parts; e.g., day/light, grass/hop/per.
2. Recognize and use primary and secondary accents for pronunciation and meaning, e.g., con'tent - content'., per'fume - perfume'.

Dictionary and Glossary Use

1. Location - (a) alphabetical order - alphabetize to third letter;
Meaning - (a) use of definitions, illustrative sentences;
- (b) interpret meanings;
- (c) select meaning to fit context;
- (d) recognize root word;
- (e) recognize and use synonyms, e.g., le leap - jump, ship - vessel
homonyms, e.g., meet - meat, write - right
antonyms, e.g., good - bad, far - near

3. Pronunciation
   - (a) introduce and teach children to interpret most common pronunciation symbols.
   - (b) most consonant sounds are represented by a letter.
   - (c) vowel sounds are represented by diacritical marks. Children should be taught to recognize and interpret them.
   - (d) accents - children should understand them by sight and sound.
   - (e) pronunciation key - to be used as a guide.
4. Spelling - use dictionary independently to:
   - (a) locate the word from the sound
   - (b) find the spelling and meaning of homonyms to fit the context.

APPENDIX II

Contrastive Analysis: English-Eskimo

A. Phonemes (Speech Sounds)

ENGLISH	ESKIMO
Employs 22 consonant phonemes.	15 consonant phonemes (does not use b, d, f, z, s, z, d, f, w, h).
All consonants can appear at the beginning of words.	Vast majority of words begin with p, t, k, q, m, n.
Phonemic contrast at the end of a word can be difficult for the non-English speaking child to differentiate, as for example the difference between "tack" and "tag" "run" and "rung".	Phonemic contrast often occurs in the middle of the word as for example "apa" (hooded seal) and "appa" (murre); "illa" (tangled trace) and "irla" (yes, a little). Moreover, rather than ending words with contrastive substantive words may end in a vowel or unvoiced stop.
Certain words end in consonants that do not appear in Eskimo. Child can experience difficulty in grasping foreign sounds.	
Certain words have only minimal contrast between final consonants as "pat" and "pad"; "top" and "tab".	
Six vowel sounds are employed (a, e, i, o, u, y). From these a wide range of allographs can be formed. For example, the phoneme "a" is illustrated in the words: Pat, bite, bout, calm, marry, bar.	Six vowel phonemes made up of a, i, u, (vowel graphemes) and a a, i i, u u (allographs). Also, two diphthongs are present, ai and au.
Many more phonemic vowel contrasts occur at the ends of words than is the case in Eskimo. For example, words such as sew, saw, Sue, sigh, sow, and sir can cause problems in terms of grasping the differentiation in sound.	
B. Morphology (Grammar System)	
Approximately 850 base words.	Approximately 532 base words.
English is an analytic language wherein two or more words can be used together to convey a meaning rather than by using suffixes, prefixes, and infixes. For example,	Eskimo is a synthetic language wherein particles are added to base words in the form of infixes, prefixes and suffixes.

ENGLISH	ESKIMO
"more often" is used rather than "oftener".	
	Complex words are constructed using process of derivation and affixation similar to those which form English complex words.
	Suffixes occur in both derivational and inflectional complex words as is the case in English.
Internal changes such as those in inflected forms of the verb ("say" - "said", "go - "went") do not occur in Eskimo verbs.	
Irregular inflection of English verbs suggests concentration on progressive tense since the base words and the suffix "ing" provides a regular pattern.	
	Verbs are formed by inflection and affixation thus difficulty occurs with English auxiliary verbs as in the verb "to be".
	Infixes perform the function of auxiliary verbs.
	Most frequently used tenses are present, immediate past, and immediate future. Distant future is rarely used.
As many as five patterns of the base verb as in "go", "goes", "going", "went", and "gone".	Base verb can have dozens of patterns as a result of infixation.
Many unique, irregular forms.	Changes in verb word formation follows a regular pattern.
A single base word can have a variety of meanings in a number of patterns or examples as in "bear", "bear down", "bear up", "can't bear", "bear right", "bear out"; and "run", "run through", "run over", "run down", "run up", "run in", and "run across".	Idiomatic usage of verbs must be handled with care since the child will be inclined to literal translations of the base verb.
Many words generated by compo-	Words are not developed through

ENGLISH	ESKIMO
sition as: "community-hall", "nursing-station", "snowball", "dog team".	composition.
	Words expressing relationship and parenthood are numerous. Relationships based on four sources: blood, adoption, marriage, name.
	No terminology to denote gender. If need be gender is expressed by adding male-female to the end of the word.
Four form classes (nouns, verbs, adjectives, adverbs).	Two form classes (nouns and verbs). Adverbial and adjectival expressions are supplied by infixes.
	Nouns have one declension and light cases.
	Each case has a single, dual, and plural form.
	Personal Pronouns when they are the subject are included in the verb.
Prepositions and conjunctions are separate, distinct words.	Prepositions and conjunctions are supplied by suffixes.

C. Syntax (Sentence Structure)

ENGLISH	ESKIMO
A common expression is "I am here".	No syntactical equivalent as the verb phrase is not contained in the Eskimo language.
Word order is the most significant feature.	Position of actor and action is arbitrary, given the inflections used. Word order is of less consequence than in English.
Determiners such as "a", "an", "the", "some", "each", cause difficulties for the non-English speaking child.	
Interrogative when combined with the negative as in "Aren't you happy" can prompt replies that are ambiguous to the English speaking teacher. In early development stages avoid this type of construction.	

D. Eskimo Words - English Equivalents

An insight into the general problem faced by Eskimo children in learning English can be gained by analyzing the English words that have been incorporated into and altered in the Eskimo language.

Eskimo	English
appu	apple
gaasi	gas
gavamat	government
guurlu	gold
jaika	jacket
jaa	jam
junni	June
januritta	generator
kaapariita	carburetor
kaapi	coffee
kaaruret	carrot
kiik	cake
kukuk	cocoa
molaassi	molasses
paatulii	battery
paippa	paper
palauga	flour
papa	pepper
pato	butter
puliisi	police
siisi	cheese
sukaq	sugar
vaia	wire
vingo	bingo

E. Pronunciation - Eskimo-English

Eskimo	English
a	As in glass or far.
e	As in met.
au	As in cow.
ai	As in bike.
i	As in bit or beet.
u	As in rub or boot.
k	As in king or a cultural kr as in crunch but rasped at the back of the throat.
g	As in Magog.
s	Midway between sack and shack. In parts of the Keewatin Region and further west "s" has an "h" sound.

Eskimo	English
ng	As a single sound as in singing.

APPENDIX III

Contrastive Analysis: English-Slavey

SLAVEY

I. Phonology

A. Sound System

1. Sounds

Alphabet of 41 symbols represents 36 consonants and 5 vowels as follows:

Consonants:

22 phonetically simple (see explanatory note +1):

/b/ very similar to English
/d/ very similar to English
/dh/ like English /th/ in "this"
/g/ very similar to English
/h/ sometimes like English /h/, but usually harsher, with friction caused by center of tongue close to roof of mouth.
/gh/ like the /h/, but with voicing.
/k/ very similar to English
/kʼ/ articulated with glottal pressure instead of lung air.
/l/ like English, but often with friction at sides of tongue.
/*l*/ like the Welsh double-L
/m/ as in English
/n/ as in English
/r/ slightly flapped similar to Scottish /r/.
/s/ as in English
/sh/ as in English
/t/ very similar to English
/tʼ/ articulated with glottal pressure instead of lung air.
/th/ as in English "think"
/w/ very similar to English
/y/ like English /y/, or like /g/ in

ENGLISH

1. Phonology

A. Sound System

1. Sounds

26-letter alphabet represents 24 consonants and 12 vowels:

Consonants:

Phonetically simple, usually written with a single letter:

/b/, /d/, /g/, /h/, /l/, /m/, /p/, /r/, /t/, /v/, /y/.

/f/ (also /ph/, /gh/, etc.)
/k/ (also /ch/ as in "anchor", etc.)
/n/ (note "nice", etc.)
/s/ (also "cent", "schism", etc.)
/w/ (note "ouija", etc.)
/z/ (note "scissors", "discern", etc.)
/zh/ (see Dictionary of Canadian English, p. XIV) as in "garage" "vision", "azure".

Usually written with two letters:

/ng/ "sing"
/th/ "think"
/th/ "this"
/sh/ (note also "schist", "machine", etc.)

Phonetically complex:
/j/ (note "judge", magic, etc.)
/ch/ (note "cello", etc.)
Also clusters:
/ks/ often written with single letter /x/

"rouge".
/z/ as in English
/ʔ/ glottal stop as heard initially in a sharply grunted "oof"

Also the following for some downriver dialects:

/v/, /f/, /p/, as in English
/pʔ/ articulated with glottal pressure instead of lung air.

14 phonetically complex:

/ch/ as in English
/chʔ/ like English /ch/ but articulated with glottal pressure instead of lung air.
/dl/ like sequence in English "paddling"
/dz/ as in English "adze"
/ddh/ like sequence in English "told them" (spoken without pause)
/j/ as in English
/mb/ as in English "tumbling"
/nd/ as in English "ending"
/tl/ as in English "rattling"
/tlʔ/ like the above, but articulated with glottal pressure instead of lung air.
/ts/ like sequence in English "let's sing" (spoken without pause)
/tsʔ/ like /ts/ above, but articulated with glottal pressure instead of lung air.
/tth/ like sequence in English "don't think" (spoken without pause)
/tthʔ/ like /tth/ above but articulated with glottal pressure instead of lung air.

Some sounds in upper Mackenzie dialects change in certain downriver dialects as follows:

/dh/ becomes /w/ or /v/;
/th/ becomes /f/;
/tth/ becomes /kw/ or /p/
/tthʔ/ becomes /pʔ/ or /kwʔ/

Vowels: (symbols in square brackets follow the International Phonetic Alphabet; see explanatory notes, +4)

wh (hw) as in "why"

Vowels: (There is some slight difference of opinion on the quality of some English vowels; see

	explanatory notes. +3. For symbolization we follow the characters given in the Dictionary of Canadian English; see explanatory notes. +2)
/a/ as in "father" /e/ as in "prey"; in certain environments pronounced (e) as in "met" or (a) as in "alone", "the". /i/ as in "machine"; in certain environments pronounced (i) as in "tin". /o/ as in "tote"; in certain environments pronounced (o) as in "horse". /u/ as in "clue"; in certain environments pronounced (u) as in "put".	/ē/ as in "machine", "meet" and a number of other spellings. /i/ as in "sit", "myth", and several other spellings. /ā/ as in "ate", "veil" and a number of other spellings. /e/ as in "met", "many" and a number of other spellings. /ä/ as in "cat", "laugh", and several other spellings. /u/ as in "ago", "comply", and many other unaccented syllables. /aa/ as in "dark", "sergeant", and several other spellings. /o/ or /ô/ as in "walk", "law", and a number of other spellings. /u/ as in "come", "trouble", and several other spellings. /u̇/ as in "good", "full", and several other spellings. /ū/ or /u/ as in "shoe", "few", and a number of other spellings.
Each vowel may be contrastively nasalized or non-nasalized. I.e., /cho/ means "big", but /cho/ with the vowel nasalized means "rain".	
No diphthongs. Where two vowels occur together there are essentially two syllables or two grammatical units.	Diphthongs: /ī/ as in "fine", "eye"; and a number of other spellings. /ou/ as in "how", "bough", and several other spellings. /oi/ as in "boil", "boy".
Vowels /e/ /i/ /o/ /u/ are pure.	These vowels are normally diphthongized to /ei/ /iy/ /ou/ /uw/
Vowels may be long or short (i.e. in duration).	
Tone is phonemic on the lexical and grammatical levels (see under those headings).	
Stress (see glossary) is not contrastively meaningful on the word level. I.e., a word's meaning is not changed by incorrect stress.	Stress is meaningful on all levels. (See also under grammar and syntax). I.e., "blackbird" is not the same as "black bird".

Greater variety of sound contrasts than in English. E.g., nasal vs. non-nasal vowels: glottallized vs. non-glottalized stops. long vs. short vowels: low vs. high vs. low-high vs. high-low tone patterns.	
2. Distribution	2. Distribution
Any consonant sound may occur at the beginning of a word except /b/ (in some dialects). /dh/ /gh/ /r/ /w/ and /ddh/.	Any consonant sound may occur at the beginning of a word except /ng/ and /zh/ (as in division).
Any consonant may occur either at the end of a word, or as the final sound of a syllable or morpheme except /h/ and /ʔ/.	Any consonant may occur in the middle of a word.
No consonant may occur either at the end of a word, or as the final sound of a syllable or morpheme except /h/ and /ʔ/. (Possible exceptions: onomatopoetic words).	Any consonant may occur at the end of a word (except possibly /h/ /w/ and /y/; e.g., in "fly", the /y/ is a vowel).
	Some clusters are never word-initials: /ks/ /ps/ /dz/ /ts/ /tl/ /vr/.
B. Characteristics	B. Carry Over
Consonants are stressed except in the middle of a morpheme. E.g., in /kˀéhzé/ "after", the /z/ is very lightly articulated because it occurs morpheme-medially. In /kˀezeh/ the /z/ is strongly articulated, occuring morpheme-initially.	Native tends to over-stress English consonants.
Vowels are basically short.	Native tends to shorten English vowels. The above two characteristics produce an articulation which causes words like "fish" and "net" to sound like mostly consonant with very little vowel, i.e., unnaturally staccato.
Vowels are pure.	Native articulates diphthongized English vowels like the pure vowels of his language. E.g., "ate" becomes (et) rather than (eit); "boat" becomes (bot) rather than (bowt).

Glottal stop /ʔ/ is a full sound or "letter", on a par with /p/ /t/ /k/. Most words have initial consonant.	Native may articulate word-initial vowels with a glottal preceding, so that a sentence such as "He's eating all the eggs" sounds staccato instead of smoothly flowing.
Stops such as the sounds /k/ and /t/ carry heavy aspiration: i.e. they are pronounced with a noticeable puff of air after the sound.	A word like "town" will be articulated with a heavily aspirated /t/, i.e. with a much stronger puff of air than is normal in English.
Word-initial /h/ is pronounced with friction produced by the back of the tongue held near the roof of the mouth.	A word like "when" will have the /wh/ pronounced with friction.
/t/ plus a friction /l/ sound is a common phoneme, something like English /cl/.	The cluster /cl/ as in "clean" is frequently pronounced as the Slavey (tl) sound.
Some minimal phonetic contrasts found in English are not significant in Slavey.	Unaspirated /p/ versus /b/ or unaspirated /t/ versus /d/ may be confused so that words like "rabbits" and "rapids" are not distinguished. The final /d/ in such a word as "dead" may be articulated so that it sounds like "debt".
II. Lexicon	II. Lexicon
A. System	A. System
Basic Slavey probably requires more words than basic English. E.g., common words such as the terms for "to be", "go", "shoot", "pick up", "throw", must be expressed in a greater variety of ways than in basic English. For example, "I am" as in "I am an Indian" is /ahtʔe/ or /ehli/ but in "I am here" it is /ahtʔi/.	Basic English comprises about 850 words. I.e., the use of these will produce acceptable English. (See explanatory notes, +8).
Tone is lexical and grammatical; e.g., two words of the same shape have different meaning if spoken high or low.	Intonation is not lexical, but grammatical and syntactical.
B. Characteristics	B. Carry Over
Many concepts not parallel to English:	Thus, "My snowshoes wore out quick because the strings weren't

A snowshoe thong is not "strong but "hard".	hard enough".
An animal has two "legs" and two "arms".	A Slavey may say his "arm" refering to foreleg.
No words for "ask" and "tell" as distinguished from "say to".	Thus, "My father told you to give him some dogfeed" was intended to mean "My father wants to know if you will lend him some dogfeed".
No words for "beautiful", "nice", "wonderful", etc. The word for "good" serves for all these.	Native frequently uses "nice" or "good" to express these concepts.
No conjunctions for "while", "when".	"If he's going..." may mean "While he's going...", or "When he goes...".
No word for "whether".	Thus, "I wonder he is going" means "I wonder if (or whether) he is going".
No word for "ever".	Thus, "Have you ever been there?" is sometimes not understood.
Concept "either...or" used less than in English.	Thus an "either...or" question may receive a "yes" or "no" answer instead of a choice.
Some adjectival concepts, e.g., "deaf", "blind", "married", normally expressed by a phrase.	Thus, "He has no eyes" may be used to mean "blind".
Ordinal numerals are found only in the lower numbers.	Native may not readily learn the use of higher ordinals.
III. Grammar (See glossary)	III. Grammar (See glossary)
A. System	A. System
Slavey is a synthetic language with verb inflection accomplished by means of series of prefixes added to a verb stem.	English is an analytical language with verb inflection accomplished by the use of internal change plus auxiliaries.
Parts of speech (or function classes or distribution classes) are: Noun and pronoun, Verb and auxiliary, Modifier, Post-position, Conjunction, Interjection.	Parts of speech: Noun and pronoun Verb, Adjective, Adverb, Preposition, Conjunction, Interjection.
Noun system is simple. No articles. Inflection used only to express possessed status.	Noun inflections express plurality and possessor status.

No system of noun derivation by affixes.	Derivational words formed by affixes. E.g., "form", "formal", "formally". All nouns are free forms.
Some nouns, e.g., body parts and kinship terms, are bound forms; i.e., they cannot stand alone. For example one cannot say simply "head". It must be "his head", "my head", "mooses' head", etc.	
A verb stem may stand alone as a noun: e.g., the stem for "to tie" standing alone means "a knot".	Many nouns may be used as verbs. E.g., "engineer", "to engineer".
Some nouns are verbals: e.g., the word for "otter" means "fast swimmer".	
Pronouns are inflected. Subject pronouns are free forms. Object and possessive pronouns are bound forms.	Pronouns are inflected. All free forms.
Pronouns do not indicate gender. Use of pronoun is optional, depending on context, since verb form carries pronominal meaning. E.g., the verb form /shéti̜/ is a full sentence, meaning "he (or she, or it) is eating".	Gender in pronouns is important. Use of pronouns is obligatory. E.g., "is eating" must be preceded by "he" to be meaningful.
Compounds are formed of: noun plus noun e.g., /tlį mehchiné/ "dog sleigh"; noun plus modifier /jiecho/ "big berry" = "orange"; noun plus verb e.g., /elak et ah/ "boat it flies" = airplane.	Compounds formed of noun plus noun e.g., "loophole"; noun plus adjective e.g., "stronghold"; verb plus adverb e.g., "outcast".
Verbs:	Verbs:
Structured around a stem carrying one or many prefixes in an intricately inter-dependent system. Thus one stem may serve for many words. E.g., /niyę́chú/ "he placed it", /yegłáyę́chú/ "he gave it to him", /táyéhchú/ "he put it on top of the bank"	Structured on base word which occurs in up to five shapes: e.g. "sing, sings, singing, sang, sung", with or without auxiliary verbs.
Prefixes carry several themes: indirect object, adverbial, direct object, number, mode, subject, and transitive/non-transitive.	Most such themes are expressed by separate words.

Types of stems may classify subject, object, or instrument of the action. E.g. in /seghámiʔáh/ "give it to me" the direct object is shown by the stem /-ʔah/ to be of nondescript shape: in /seghá-ni hgé/ "give it to me", the object is stick-shaped.	
Verbs can be grouped in classes according to types of perfective tenses. More regular and predictable than in English.	To classify English verbs structurally would be cumbersome, producing over 50 classes. Functional classification is more workable.
Present tense shape does not predict classification by perfect tense. E.g. /nidichu/ "he picks up", /nidichú/ "he picked up"; but /nididhah/ "he picks them up", /nididhah/ "He picked them up", i.e., two verbs of similar shape and identical present tense, but employing different past tenses.	True also in English: E.g., "peep" and "peeped", but "keep" and "kept".
Five possible modes, not exactly parallel to English modes or tenses. These are amplified by auxiliary verbs.	Well over a dozen tenses and modes may be formed by the base word plus auxiliaries.
Imperfective (similar to English present) is used more than English present, and perfective less than English past tense.	
Many verbs have dual as well as plural forms. E.g., /detla/ "he goes", /ĺengedetthi/ "they two go", /gogedehthi/ "they three (or more) go".	
Five modes plus possibility of twelve inflected forms allows for upwards of 60 forms of one verb.	
Tone is grammatical i.e., a two-syllable verb spoken with two low tones may have different meaning if spoken with high/low. E.g., /jih/ "mitten", but /jih/ "fish-hook".	
Stress is syllabic, i.e., on any given syllable it is conditioned by tone	Stress is grammatical: e.g., "blackbird" is different from "black bird".

and by class of morpheme. Closely associated with stress are juncture and consonant-stress.	Stress is also syntactic.
E.g., the phoneme /z/ in the middle of a word, initiating a separate morpheme, is heavily stressed. The same sound in the middle of a morpheme is very lightly articulated. (See example under I.B., page 5) Also associated with these phenomena is elision: i.e., the dropping of word-medial consonants on certain types of unstressed syllables. E.g., /nagogédehthe/ "They started out again" may be pronounced /naogédehthe/.	
Modifier:	Modifier:
There is no comparative or superlative inflection of adjectival or adverbial words. Most modifiers may be used with noun or verb: e.g., the word /nezu/ "good" may apply to a good thing or a well done action. Some modify only nouns or only verbs.	Adjectives and adverbs are inflected for comparative and superlative forms. A modifier usually modifies either nouns or verbs, but not both.
Postpositions are bound forms, appended to (and following, as the name implies) a verbal or a nominal functioning almost exactly like English prepositions.	Prepositions are free forms, preceding nominals (as the name implies).
B. Characteristics	B. Carry Over
No gender signified by pronouns.	Indian speaker may confuse "he" and "she", "his" and "hers", "him" and "her".
Verb system of inter-dependent mode and subject-pronoun prefixes required correct useage of understanding. Imperfective mode used more than English present tense.	Indian speaker may tend to use present tense very widely. English system allows such usage to be understood by means of context, so that the error will be perpetuated habit, unless given special attention.
Modes not exactly parallel to English tenses.	Indian speaker may learn only a few of the English tenses, unless coached.

No comparative/puperlative inflection of modifiers.	Indian speaker may tend to use an expression like "He was strong more than him".
Paucity of adverbial words.	Indian speaker may fail to learn a wide variety of English adverbs.
Fewer conjunctions than in English. A common expression /itʔah/ translatable as "so", "therefore", "that's why", etc., means literally "with that" and is used almost with the frequency of the English word "and".	Indian speaker may not utilize a variety of English conjunctions. May use the literal translation "with that", meaning "so", "therefore", "consequently", etc.
IV. Syntax	IV. Syntax
A. System	A. System
In a typical sentence of clause, the verb follows the other constituents e.g., /i dene tthʼikʼihi méchiné nezu seghánįghe/ "that man gave me a gun with a fancy stock" is literally "That man gun its stock good to me he gave". Note above that noun subject, noun object and indirect object all precede the verb. Adjective follows noun.	Subject normally precedes verb; noun object normally follows. Indirect object may precede or follow.
Word order important. /tli dene itlah/ "The dog bit the man" is literally "dog man he bit". /dene tlį ńanihkʔé/ "The man hit the dog" is literally "man dog he hit".	
Interrogative is signalled by a function word at beginning of sentence, or following verb. No change of word order. E.g., "Do you want some tea?" may be worded /sį lidi nenedhę elį/; or merely by rising sentence - final intonation /lidi nenedhę?/	Interrogative is signalled by word order: "Did they...", "are you...". May be signalled simply by rising sentence-final intonation, e.g., "You went to town?"
Grammatical tone is more important than intonation, but syntactical intonation is also present as for example in the third type of interrogative described above. Does not normally change tones, but only their relative level.	Eleborate system of syntactical intonation, with stress patterns closely tied in. E.g., the great difference between "He went to town" and "He went to town!?" is signalled entirely by intonation and stress.

Redundant use of pronouns is correct. E.g., "Me I want to go".	Pronominal redundancy not considered correct.
Negative question is normally answered in the affirmative. E.g., "You didn't go?" elicits the answer "Yes (I didn't go)"	Normally answered in the negative.
No word for whether, as in "I wonder whether (if) they went".	
No indirect quotation. All reporting of conversation requires direct quotation.	Indirect quotation more common than direct in reporting conversation.
Words do not change meaning in idiomatic expressions.	Idioms very common, changing the basic meaning of the word: e.g., "hit" in "hit the trail".

B. Characteristics	B. Carry Over
No change of word order to signal interrogative.	Indian speaker seems far more frequently to employ simply intonation ("You're not going...? etc.) than the inverted word order (Aren't you going...?"). Sometimes appears not to understand inverted useage.
"Either...or" concept not common.	Indian speaker often fails to respond as expected to an "either... or" question.
Very few idioms which change the basic meaning of the constituent words.	Indian speaker may not learn to employ common idioms in English speech.
No indirect quotation.	Indian speaker often uses direct quotation where normal English calls for indirect quotation. Following Slavey pattern, he sometimes fails to make clear (to English speakers) who is being quoted.
No word for "whether".	Indian speaker commonly says, "I wonder he is going to go".
Grammatical tone more critical than syntactic intonation. Stress is associated with tone and certain types of morphemes. (See under grammar).	Indian speaker frequently does not grasp the crucial and intricate pattern of English intonation and stress. Following are sentences gleaned from actual conversation, first as the native uttered them, followed by his actual meaning (asterik indicates following word

or syllable is stressed, with accompanying rise in intonation):

"They *don't *want to *wait for *each *other" meant "They *don't want to *wait for each other".

"*What's his *phone *number?" meant "*What's his *phone number?"

"It *used to *be nine *dollars" meant "It *used to be *nine dollars (i.e. not ten)".

Glossary

Bound form and free form: A bound form cannot stand alone, in contrast to a free form. E.g., the "ly" in formerly.

Free form: See Bound form.

Grammar (grammatical, grammatically): Used here to signify the structure of words including verb tenses. (Linguistically known as Morphology).

Lexicon (lexical, lexically): The inventory and distribution of words and/or types of words.

Morpheme: A grammatical unit carrying specific meaning. May be a full word such as /dene/ "man", or a single sound as for example a high tone representing tense and person: e.g., /dehtlah/ "I went" contrasted with /dehtlah/ "he went".

Phoneme (phonemic, phonemically): A single meaningful sound in a language's sound system. All languages have non-meaningful phonetic sounds inter-related to the phonemes. E.g., the /t/ in "stop" is phonetically different from the /t/ in "top", but the difference is not significant.

Phonetically simple and phonetically complex: /d/ is a simple sound, produced at only one point of articulation in the mouth. /ch/ is a complex sound actually consisting of /t/ plus /sh/.

Phonology: The inventory and system of the sounds of a language.

Stop: An explesive sound, such as /p/, /t/, /k/.

Stress: The emphasis in speech on a sound or syllable.

Syntax: The structure of phrases, clauses and sentences.

Explanatory Notes:

1. Linguistic terminology has been used sparingly. E.g., we have employed the term "grammar" where "morphology" would be more correct and precise. For those few linguistic terms that have been used, see the short glossary.

2. Pronunciation and symbolization of English vowels follows page XIV of The Dictionary of Canadian English, The Senior Dictionary, edited by Avis, Drysdale, Gregg, Scargill, published by W.J. Gage, Toronto, Copyright 1967.

3. Classification of the 12 English vowel sounds follows the system used by Norman C. Stageberg, page 18 in An Introductory English Grammar, Second Edition, Holt, Rinehart and Winston, Inc., Copyright 1971, (with a few modifications to emphasize phonetics rather than phonemes). Phonemes are indicated in slants / /.

4. Symbolization of Slavey vowel sounds follows the International Phonetic Alphabet as given in Funk and Wagnell's Standard Encyclopedic Dictionary, J.G. Ferguson Publishing Co., Chicago, 1968. Phonetic sounds are enclosed in brackets ( ) to distinguish from phonemes in slants //.

5. The data for Slavey are based on the Fort Simpson dialect. Other dialects may show some variation.

6. The English alphabetical order is followed for convenience, with some departures for purposes of classification.

7. Under descriptions of the systems, remarks have vertical reference to the language at the head of the column. Under carry-over, remarks have horizontal as well as vertical reference: i.e., showing characteristics of the native language which are carried over into English speech.

8. Documentation on basic English: College Handbook of Composition 4th Edition Woolley and Scott, published by D.C. Heath and Company, Boston, 1944.

9. Some points will be found repeated, since they are first described under the system and then illustrated under characteristics and carry-over.

MATHEMATICS

The Nature of Mathematics

Mathematics is a way of thinking. All the quantitative and spatial aspects of man's thought concerning the universe are contained in the disciplines of mathematics; they are described and defined by its language: controlled and organized by its logic.

Without mathematical thinking, life and thought are impossible: the history of mankind is the history of the development of mathematical thinking: from the collective nouns evolved by the hunter; to the stellar cycles observed by the agriculturalists; the traders need for money and measures; the citizens involvement with statistics; toward pure mathematics, and speculation on the nature of the universe; gamesmanship ranging from "eeny, meeny, miny, mo" to probability, permutations, puzzles, calculated risks, and the trajectories of golf-balls; through the indefinable realms of mathematics, communication and culture become synonymous.

As yet, there is no indication that any one aspect of mathematics is more essential than any other one; but, it is descriptive, definitive language and the logic of mathematical thinking which is vital to the development of thought.

The Teacher and Mathematics

We are certain that if mathematics is viewed as a subject to be explored by both the teacher and the child, as opposed to being "discovered" by the child, or being "taught" by the teacher; that many of the available opportunities will be taken, and will be used to advantage; the only limit being that of the child's understanding. We realize that few teachers have discovered mathematics for themselves, and that few have had a mathematical education; but all teachers recognize the value of mathematics to children, and the enormous role played by mathematics in all societies; and that teachers wish to give children a broad mathematical education; an education which is appropriate to today, and for tomorrow.

Due to the pressures of society, generated by nuclear-fission, and space-exploration, mathematics has been given a significance in education which is out of proportion to its significance to the child, or to the child's interests and needs. We appreciate that this is not a new phenomenon in education; the demands of the industrial revolution, for mechanics and bookkeepers, produced a similar over-emphasis; what is new, is the way in which so much "noise" is being generated through the communication system ... "The isle is full of noises ..." and 'admass' has become 'admaths' ...

Inundated on all sides, teachers are being urged to teach 'this' rather than 'that'; to follow 'this' method, to abandon 'that' ... much of this advice is ill-conceived and conflicting; on one hand, a rich background of mathematical experience is advocated; on the other hand, it is deemed essential to build a Utopia with sets of coloured bricks: the computer is re-discovered, and teachers are advised to stop teaching computation to children - we feel that the same advice was also given in the early days of the abacus! In this situation, many teachers feel confused and inadequate, suddenly they are confronted with aspects of mathematics of which they have been unaware, together with conflicting advice regarding "what" and "how" to teach.

To this situation, we can apply two simple tests: first, we can apply William of Ockam's Razor, i.e. that 'entities should not be taken beyond necessity'; which will cut back many of the inferences made from situations quite unrelated to, either the child, or to mathematics. Secondly, we can remember the warning given by Professor Whitehead against - "inert ideas - that is, ideas which as the time when they are imparted have no bearing upon the child's natural activities of body or mind and do nothing to illuminate or guide his experience".

In schools, we are concerned with the changing and developing needs of the child, and with those aspects of mathematics appropriate to him, this presents us with a very large, and a very real problem - "How can we enrich the mathematical understanding of each child, in a way which is appropriate both to the child, and to his constantly changing world?"

We suggest that this question is answered, not by the invention of a new and unscientific pedagogy; but, by taking the child's present development as the starting point, placing him in real situations which are rich in mathematical experiences, helping him to organize his experiences, and helping him to find the solutions to the questions that he poses. This will form the beginning of the exploration, with the teacher as a guide; if both the child and the teacher will search for answeres, solutions will be found, or new questions will be asked.

The Child and Mathematics

Mathematics is a way of thinking; a language, a logic. To develop this, it is vital that we appreciate the differences in the ways in which children think. According to Z.P. Dienes, 'Child A may think analytically; Child B constructively; Child C may reach conclusions logically, step by step. Child D may reach conclusions intuitively and then create a logical argument to support them'. Each of these aspects of reasoning is essential to mathematical thinking; they should be recognized in our own thinking also. Provision for these differences must be made in the evolvement of and conduct of mathematical situations, with continuous awareness of the fact that communication and the transmission of ideas takes place in many ways.

In the exploratory situation, the child's interest and enthusiasm will develop with self-confidence and success. Children will not learn 'operational tricks' in a secret code of signs and symbols; neither will such gymnastic feats as 'turning upside down to multiply' be required. They will explore situations which demand a language, and having gained that language for themselves, in situations that they understand, they will use it with constantly growing sureness and precision; adding to it, enriching it, as their experience widens and deepens. The child can gaze into the sky; he can think about a picture of a packet on a packet with a picture of a packet on it; he can look into a mirror opposite a mirror to gain his first intimations of infinity ... We should be guided by the child's interests, abilities, and his questions. These questions, arising from mathematical situations, will lead to answers; answers relevant to the child's level of understanding. Some answers will be incomplete or inconclusive - leading to further questions, which will in turn indicate the actual needs of the child.

Classroom Considerations

In our attempts to provide a wide, in depth, appropriate mathematical education, we should ensure that 'what is known' is known in depth. If the suggestions contained in this outline are pursued, the child's understanding will be based upon concrete, situational experiences. But, it is vital that this experience be 'verbalized', that the language of mathematics be used, and that it is continuously inter-related with the child's development of and understanding of mathematical thinking. The child needs security in his mathematical thinking, i.e. a basis of experience which is verbalized, and made memorable.

Individualized programs based upon understanding, have generally replaced 'en masse' note-learning; environmental explorations are replacing the 'workbook only' mathematics; innumerable eclectic approaches are rampant everywhere. However, it should be remembered that, it is the responsibility of the teacher to ensure that learning does take place. Obviously, no one needs to deduce the number of cents to the dollar, nor the number of degrees in a circle, throughout his life. Basic facts, accuracy of operations, efficient procedures in recording observations, and an understanding of inter-relationships, need to be known, to be used, and to be inter-related in a relevant context. The child should develop knowing 'more about more', not 'less about more'.

Children with "learning disabilities"; of difficulties in abstract thinking, visualizing, associative or bi-associative thinking; or who for some reason appear "failure-destined", must have, from entering school, a broad, diverse, high-interest, mathematical education which is based upon concrete, realistic situations; with opportunities for acquiring and practicing the language of mathematics. Such a child should not be stagnating; but, if he can only learn by being told, then he should be told.

Records are vitally important. The child's work should be kept in a file folder. The cumulative record card should be concise and appropriate; such records when viewed in retrospect provide new insights into the child's development and needs. Suggestions for recording are included in the outline.

Conclusions

What we should have achieved is to have left the child with an open-mind, a basic understanding, and a language with which to continue his explorations; a child full of wonder; a child still uncertain of all the questions that remain to be asked. We want children who will continue to wonder, and to ask questions. We have machines that will go on answering.

PROGRAM GUIDE
Kindergarten Through Level Six

CORE PROGRAM: Nuffield Mathematics Teaching Project: (Longman's of Canada).

plus

'Mathematics for Schools', An Integrated Series (Addison-

Wesley of Canada)

CORE EXTENSION MATERIALS: 'Mathematics Laboratory Materials': (McGraw-Hill of Canada).

SUPPORTING PROGRAM: 'Greater Cleveland Mathematics Program': (S.R.A. of Canada).

ALTERNATIVE SUPPORT PROGRAM: 'New Dimensions in Mathematics': (Fitzhenry and Whiteside Ltd.)

ALTERNATIVE PRIMARY PROGRAM: (K-3): 'Project Mathematics': (Holt, Rinehart and Winston).

ACTIVITY CARDS: (All levels): 'Developmental Mathematics Cards':

1) Primary Set A-F:
2) Junior Set G-L:
3) (Addison-Wesley of Canada).

'Primary Geometry Activity Cards':
(Moyers Vilas: +81-4456).

EQUIPMENT: A good selection of assorted apparatus and equipment is available from Moyers Vilas Co., Edmonton, Alta.

METRICATION: Information, suggested equipment, and current Canadian Provincial developments will be available from the Curriculum Division, Yellowknife.

REFERENCE BOOKS: Many useful books are available from various publishers, and selections should be made for libraries within the criteria in the 'Learning Materials Catalogue'. We recommend the 'Franklin Mathematics Series' (McGraw-Hill Ryerson), as a useful and comprehensive set of reference books.

GUIDE AND KEY FOR MAJOR CONCEPT DEVELOPMENT CHARTS

Levels

Levels indicated: 1, 2, 3, 4, 5: Approximate to the number of years in school; i.e. a child working on Level 1, may be in Kindergarten or Grade One, depending on the child, and on local circumstances. We feel that 'appropriate levels' should be based upon the child's understanding and capabilities.

Concept Outlines and Notes

These are divided into three sections, for convenience of organization only; we assume that the content of each section will be developed and inter-related with each of the others:

1) 'Measurement and Relationships'.
2) 'Shape, Space and Movement'.
3) 'Number and Relationships'.

Legend for Concept Guides

xoxoxox = Organized Experiences.
dxdxdxd = Directed Activities.
xtxtxtx = Extended/Enriched Learning.
xxxxxxx = Continued Throughout.

……

Please Note:

These outlines and notes, etc., are NOT a "Northern Cookbook" of recipes for instant success; they merely indicate some of the possible 'ingredients'. Each teacher should, with conscious self-control, weight, measure, and assess the suggested content, devices, and techniques, in relation to each individual in their class, to themselves, to the complete school program, and to their geographic location.

MAJOR CONCEPT ONE

MEASUREMENT AND RELATIONSHIPS	1	2	3	4	5
A) Graphing of Simple Relationships:					
- size, position, form, quantity;	oxoxo	dxdxd	dxdxd	txtxt	txtxt
- real charts, pictograms, 3D charts;	oxoxo	dxdxd	dxdxd	txtxt	txtxt
- Block charts, column charts, pie charts;	oxoxo	oxoxo	dxdxd	dxdxd	dxdx
- percentage strips, straight line graphs;			oxoxo	dxdx	dxdx
- curved line graphs.				xoxox	dxdx
B) Sets:					
- attributes of sets;	oxoxo	dxdxd	txtxt	txtxt	txtxt
- sets in number; using sets;	oxoxo	dxdxd	dxdxd	dxdx	txtxt
- mapping and tabulation.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
C) Currency:					
- denominations, relationships, values;	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- Canadian, U.S.A., Others;	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- money-systems in everyday life.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
D) Time:					
- awareness, estimation, standard units;	oxoxo	dxdxd	dxdxd	txtxt	txtxt
- relationships of time.	oxoxo	dxdxd	dxdxd	txtxt	txtxt
E) Weight:					
- approximation, non-standard units;	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- standard units;		oxoxo	dxdxd	txtxt	txtxt
- relationships of weight.			oxoxo	dxdx	dxdxd

MEASUREMENT AND RELATIONSHIPS: (Cont'd)	1	2	3	4	5
F) Linear Measurement:					
- approximation, non-standard units;	oxoxo	oxoxo	dxdxd	txtxt	txtxt
- standard units;		oxoxo	dxdxd	dxdxd	txtxt
- relationships of linear measurement.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
G) Capacity:					
- estimation, non-standard units;	oxoxo	oxoxo	dxdxd	txtxt	txtxt
- standard units;		oxoxo	dxdxd	dxdxd	txtxt
- relationships of capacity.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
H) Temperature:					
- estimation, improvised units;	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- standard units;	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- relationships of temperature.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
I) Volume:					
- estimation, non-standard units;	oxoxo	oxoxo	oxoxo	dxdxd	dxdxd
- standard units;		oxoxo	dxdxd	dxdxd	dxdxd
- relationships of volume.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
J) Area:					
- approximations; non-standard units;	oxoxo	oxoxo	oxoxo	dxdxd	dxdxd
- standard units;			oxoxo	dxdxd	dxdxd
- relationships of area.	oxoxo	oxoxo	oxoxo	dxdxd	dxdxd
K) Properties of Equality and Inequality:					
- solving by inspection;	oxoxo	oxoxo	oxoxo	oxoxo	oxoxo
- by using place-holders.		dxdxd	dxdxd	dxdxd	txtxt
Extension: Metric Measures.					dxdxd

MEASUREMENT AND RELATIONSHIPS

Units of Measure

The ability to estimate with some degree of accuracy is just as necessary as the ability to compute exactly. Whenever children are set to weigh or to measure lengths, distances and areas, capacity or volume, time, speeds, costs, totals, etc., they should form the habit of estimating the likely result before the actual weighing etc., [illegible] place.

It [illegible] equally important that a record of the results of these estimations and measurements is made. This recording may take the form of simple figures.

written calculations, written sentences, tabulation, mapping, diagrams, graphs, equations, etc. Attention should be paid to the three basic stages which are normally involved in any of this work, i.e. Estimation, Measurement, and Recording.

It is impossible and undesirable to suggest a generalized approach for such a vast area as units of measure; but the following sequence of activities may be found appropriate:

1) The sorting, matching, grouping, and comparison of diverse objects, in order to develop such language as - wide, narrow, short, long, heavy, light, tallest, smallest, thick, think, etc.
2) The use of structured and play materials as improvised units of measurement, to make comparisons within the child's immediate environment.
3) The use of personal measurements.
4) The introduction of the standard Canadian (and then Metric) weights and measures.

It is anticipated that children will first experience the mathematical relationships and processes of measurement without the necessity for formal computation. This experience can later be applied to any necessary calculations which are appropriate to the needs of the children.

Particular attention should be paid to 'Currency'; money plays such a tremendous role in everyday-life, that early experience in handling of coins and bills of different denominations, in counting and changing money, and in 'making' change, should be given. It is recommended that actual coins and bills be used.

Approximation

This is equally as important as estimation; thus 9 is almost 10, 16 ¾ pts. is almost 2 gallons, etc.

In notation, the left-hand digit has most value, so in approximating with common measures, notice is taken first of left-handdigits. In the early stages, children will only use the more common units of measure, thus having opportunity to approximate; they should be guided in doing this, with reference to the nature of investigation.

This will lead to the need for averages; later this concept will be developed to a greater extent.

Graphing Of Simple Relationships

1. Real Charts

These are life-sized drawings in graphical form, e.g.:

a) Actually tracing the growing bean, and adding the new length each day.
b) Tracing in chalk the shadow made by the 'shadow stick' placed near the school, and noting the uniform lengthening and shortening.
c) Standing children against a piece of paper, which is attached to a wall, and tracing them in outline, to give a 'graph' of their heights.

2. Pictograms

Here, a pictorial symbol closely resembling the object, is used to represent that object, e.g.:

a) Template pictures of children used to build up a 'graph' to show absentees in the class each day.
b) Template drawings of vitamin biscuits, to represent the actual number of biscuits consumed over a period of time: cf. day, week, month.
c) Information can be represented by symbols, e.g. represents ten children.

3. 3D Charts

Books, wooden cubes of uniform size, match boxes, poppet beads, beads on wire, thumbtacks on board, etc. representing, e.g. people; are examples of 3D charts.

N.B. The transition from real charts, pictograms, and 3D charts to block charts, where the symbol used is a square of paper, SHOULD BE VERY GRADUAL!

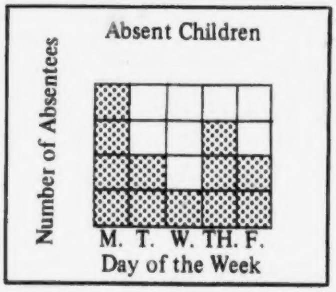
4. Block Charts

Points to remember:

Insert a title to the chart.

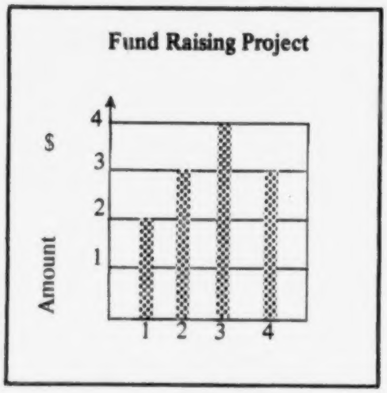
If numbers can continue further indicate this by an arrow.

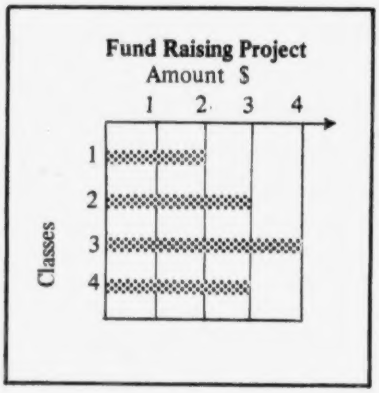
Write along both axes to show what is represented.



5. Column Charts

These are very similar to block charts, except that here, the blocks are replaced by columns or lines. They are usually vertical, but may be used horizontally, e.g.:





Practical Note

When starting the transition into block and column charts, zip-fasteners - stapled onto heavy board, provide an interesting and useful tool. A large, heavy-duty zip-fastener can be used to demonstrate variations in temperature - especially for young children.

Weather Recording

It is recommended that the preceding types of charts, 1-5, should be used for weather recording in the elementary school.

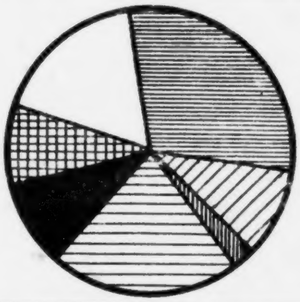
6. Pie Charts

These are so called because of their resemblance to the top of a pie, and NOT through any relationship to the symbol π . Common in newspapers, atlases, brochures.

All data must be used, or the chart is meaningless. E.g., if the chart represents one's weekly expenditures, every cent must be accounted, and included.

Pie Chart of Weekly Expenditures.

Legend: - (as appropriate).

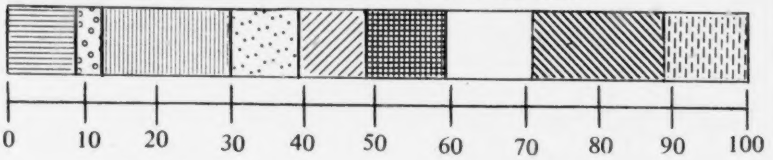


They should only be used if the children are familiar with the more simple ways of dividing a circle into fractional parts; as with a clock-face; or in the cutting up of a cake; for more complex charts - ability to use a protractor is implied.

7. Percentage Strips

Coloured paper, crayons, etc., should be used to complete the diagrams. Topics as appropriate.

Percentage Strip to show - Personal, Weekly, Time Allotment.



Legend:

▤ Film-shows
░ Dances
▥ School

░ Store
▨ Church
▦ Clubs

□ Outdoors
▧ Visiting
▥ Home

N.B. It cannot be over-emphasized that, the construction of a chart or a graph is NOT a final stage

It should be followed by class and group discussion, and be displayed for individual inspection; in order that definite conclusions may be reached. In many cases, a final, written report will be invaluable.

N.B. COLOUR, TEXTURE, AND UNIFORM LETTERING, in all forms of charts and graphs, may help children to differentiate between items recorded, and to add clarity.

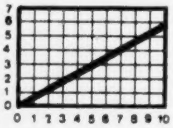
GRAPHS

Graphs show a definite and continuous relationship.

1. Straight Line Graphs

The Lines should only be drawn when all intermediate points have value.

At a later stage, after a casual introduction of x, (horizontal axis), and y, (vertical axis - showing the variable), the relationship y = ax, (in this case, y = ax), may be realized.



In graphs of this type, it may be that opportunity will arise for the introduction of directed numbers.

There will also be occasions when the line does not pass through O as the origin; e.g. a graph showing Centigrade/Farenheit Conversion.

2. Curved Line Graphs (As appropriate).

Initially, these should not be referred to in algebraic form; although some children may discover this relationship.

Construction of Charts and Graphs - will follow this sequence:

1) Observe and collect information by measuring, fact-finding, recording, etc.
2) Tabulate the information - this may require discussion and thought. What are we trying to show? How can we present this most effectively? What does the information suggest? Is the presently known information adequate?
3) Calculate a suitable scale, taking into account maximum and minimum.
4) Draw the chart or graph accurately. Are the axea designated? Is there a statement or title? Is a legend required?
5) Make use of the chart or graph. Reading information, drawing conclusions, discussions.
6) Consider possible extensions.

Sets

Set theory was developed during the last century, as a technique in the mathematics of logic. George Boole, who developed symbolic logic, argued that all propositions in logic could be expressed by symbols; the result was the system of 'Boolean Algebra' set out in his "Laws of Thought".

George Cantor, who attempted to make a definition of the infinite, used set theory to show that different orders of infinity existed: e.g. that the set of whole numbers, although included in the set of whole numbers and fractions, was itself infinite.

During the early years, children begin to collect and to classify. Their collections, or sets, can be arranged according to a particular attribute which the objects in their collection possess: e.g. quantity, size, colour, shape, thickness, texture, etc. In a sense, this may be a child's first attempt at abstraction, because he finds that each element in a set has certain qualities which qualify it to membership of that set: e.g. triangles, or animals have an easily recognizable patterns. The opportunities for children to collect and classify are many.

It is not suggested that children become acquainted with everything in this section; but most children will enjoy working in sets with Venn diagrams - using hoops and ropes on the floor, or heavy-string on the tables - for set-frames; if they are encouraged to classify and express the relationship between things. Sets provide a simple and logical language which will extend and refine their thinking.

Experiential learning through individual and group assignments, and field work, would appear especially appropriate here. Children should be given opportunities to use the language of sets in all aspects of their studies; at a later stage, the interpretation of the relationships presented in symbolic form would be appropriate. The language of sets is ideal for the T.E.S.L. (Teaching English as a Second Language). It is felt that, in the early years, more emphasis should be placed upon the use of sets in real situations involving real things - than upon number. It is the use of logic which is of paramount importance, not the ability to use signs and symbols to express the obvious!

Schools should examine carefully the relation of sets to the needs and experiences of the children. There is no virtue or value in children acquiring a language they will not use; and many books currently purporting to introduce children to sets do no more than introduce the language and the symbols, without indicating any relevance to the child's experience or needs.

SYMBOLIC LOGIC:

It is recommended that, if set theory is to be introduced as the basis and development towards symbolic logic; that the following books be used as a basis for this work; -

"Primary Mathematics". Z.P. Dienes (Macmillan)
"The Language of Mathematics". F. Land (Murray)
"Mathematics". "Life" Science Library

ATTRIBUTES OF SETS:

Each element of the universe can be described in terms of: - shape, size, colour, weight, and thickness: these are known as ‘attributes’. Correct terminology should be used from the beginning stages; descriptions should be accurate and complete; as these form the basis of all developments in communications: E.g.: “Large, yellow, thin, squares”. Sets of attribute blocks may be self-made; however, we recommend the following manufactured sets: -

“Ascoblocs” available from: Braut & Bouthillier, Montreal, P.Q.
“Attribute Blocks” available from Moyers Vilas, Edmonton, Alberta.
“Attribute Blocks ” available from E.S.S. (Science Program) together with the children’s book: -
“The Weeple People”; D.S. Gillespie: McGraw-Hill Co. 1971.

NOTE: Three sets of identical attribute blocks are required for the development of attributes of sets.

Using Attribute Blocks: -

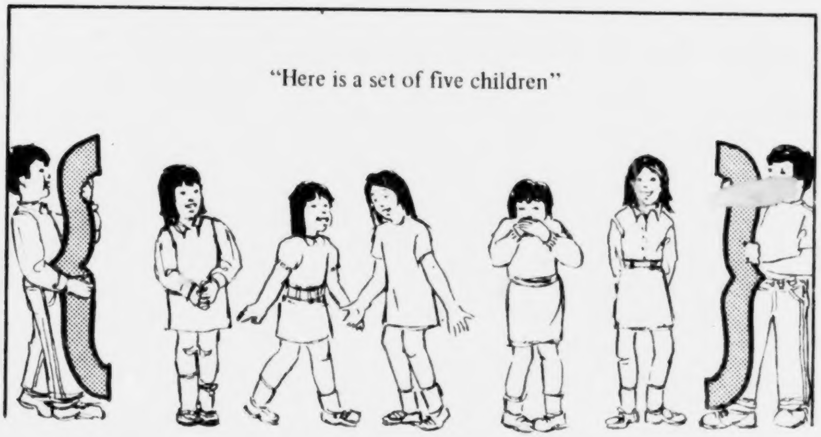
(a) Introduction of material. Description of elements. Discussion, guided building with elements. Attributes.
(b) Relationships of elements. Sorting, matching, comparisons. Universal set. Subsets.
(c) Separate sets; disjoint sets; using hoops and ropes to define set boundaries: cf. Venn Diagrams.
(d) Attributes - differences recognized, verbalized, and practice established. Attribute change games: (1, 2, attributes changed), precise description of changes. Group activity; child/child: child/teacher: etc.
(e) Co-operative games; linear attribute games; increasing number of attributes changed. Competitive games. Dimensional, space-filling, and matrix games. Time limits introduced: use of stop-watch. Missing elements. Quizzes.
(f) Sets. Intersection. Subsets. Union of Sets.
(g) Symbolism: Children should be encouraged to create and evolve a symbolism which is appropriate and acceptable to them: e.g.: -

Statement: - “Large. Thick. Red. Triangles.”
Symbolism: L TH. R. Trs.

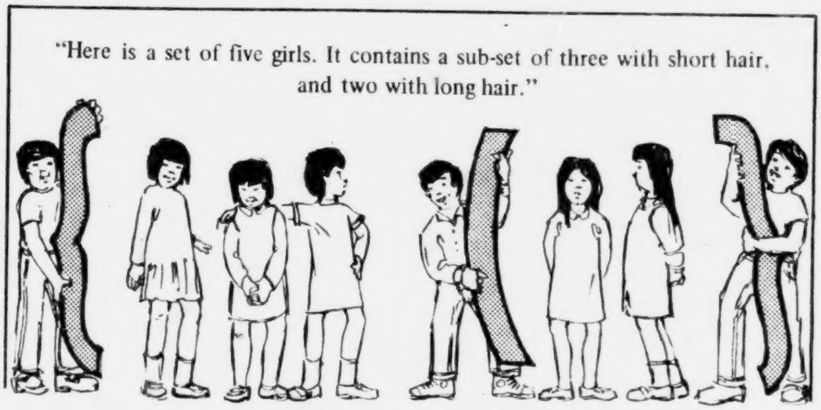
(h) Attribute Cards; structuring of games: pictorial or symbolic.
(i) Introduction of ‘negative’, ‘and’, ‘or’, ‘but’ ...E.g. “Not (blue and thin).., - using the brackets to prevent ambiguity. Precision and familiarity with the phrasing is essential in making choices. Extension of games.
(j) Introduction of ‘either...or’, ‘either...or...or...’; negatives; casting aside. Hoop games, extensions, etc.
(k) Operating games: ‘if...then’ ’”Multiple changes.
(l) Symbolic logic; using ‘Lukasziewicz Code”.

SETS: ATTRIBUTES OF SETS: USING SETS: - IN THE EARLY STAGES:

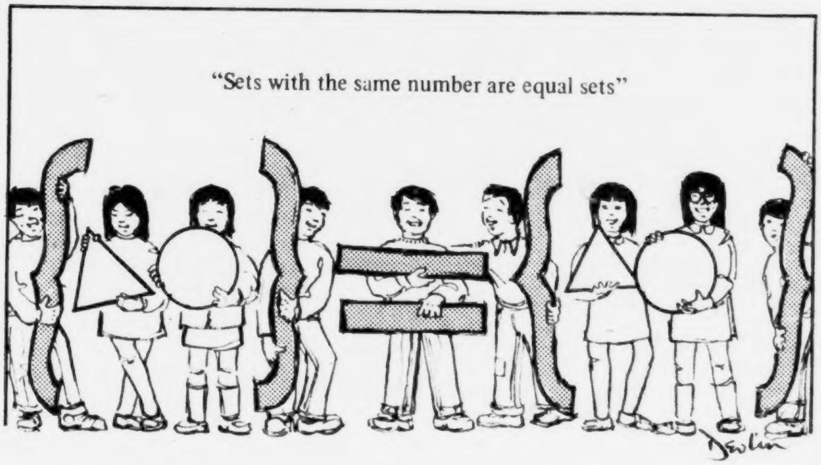
Children dramatize sets:. acquire language; using life-sized figures and brackets; ‘read’ set formations; moving from concrete to abstract.



"Here is a set of five children"

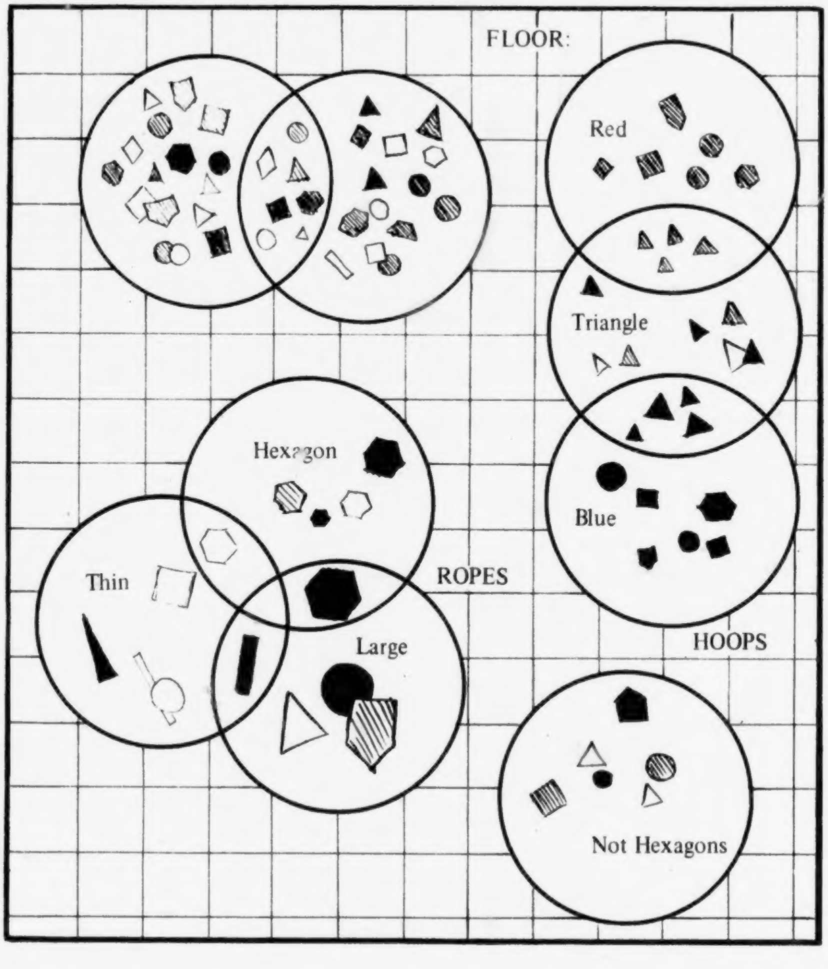


"Here is a set of five girls. It contains a sub-set of three with short hair, and two with long hair."



"Sets with the same number are equal sets"

ATTRIBUTE GAMES:


FLOOR:
Red
Triangle
Blue
Hexagon
Thin
Large
ROPES
HOOPS
Not Hexagons

	Red	Yellow	Blue
Squares			
Rectangles			
Hexagons			
Triangles			
Circles			
(Thick or Thin) and small.			

MATRIX GAMES
may beplayed on 7 x 7 tiles, marked off with tape; a chalkboard laid flat on the floor is useful for this.

SETS IN NUMBERS:

In the number series (1, 2, 3, 4, 5, ...96, 97, 98, 99, 100), which represents the set of natural numbers from 1-100, one can say that 3, (or any other number in the series), is an element of the set of natural numbers 1-100.

A set is represented algebraically by a capital letter, the element by a lower case letter: e.g., f $\in$ B: f is an element of Set B: one can use this to represent that 55 belongs to the set of natural numbers 1-100: to show that something is not an element of the set one would indicate $\notin$: e.g. 155 $\notin$ B.

A universal set is the original set before division: e.g., one could have a set of all musical compositions: from this one could select sub-sets, e.g., the works of Beethoven, Gershwin, McCartney, etc. If A was to represent the universal set, and B, C, D...sub sets, one could say that A includes B, C, D... In particular, B is a sub-set of A, written B$\subset$A: NOT B$\in$A, because B is a set, not an element. (5, 5, 7, 8,) and (7, 5, 8, 6,) are identical sets, because every element of one set is an element of the other. When the number of elements in two sets is the same, but the elements themselves are different, e.g., (A, B, C, D,) and (5, 6, 7, 8,) we say that they are equivalent, i.e., A$\leftrightarrow$B. Set A is identical to Set B, if every element of Set A is an element of Set B; and conversely, if every element of Set B is an element of Set A: i.e., A = B: B = A.

When a set has no elements, e.g., the set of bicycles with square wheels; it is a null set, written $\emptyset$.

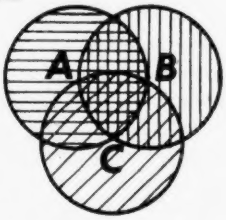
SYMBOL	MEANING	SYMBOL	MEANING
$\emptyset$	the empty set: null set	$\not>$	is not greater than
} { [ ]	brackets: braces:	Ʊ	the universal set
$\in$	is a member of	$\subset$	is a sub-set of
$\notin$	is not a member of	=	is equal to
$\longleftrightarrow$	is equivalent to	$\neq$	is not equal to
$\not\longleftrightarrow$	is not equivalent to	n }A{	the cardinal number of Set A
$\sim$	is equivalent to	$\cup$	union of sets
$\nsim$	is not equivalent to	$\cap$	intersection of sets
$<$	is less than	}a,b,c,d,....{	continued in a series
$\not<$	is not less than	} a,b,{	the ordered pair a, b
$>$	is greater than	• • •	an elipsis

VENN DIAGRAMS: -

Set vocabulary is best illustrated by using Venn diagrams; frequently, in text-books etc. Venn diagrams are shown as regular rectangles and circles; this is not essential: freehand drawings by children - of sets, may be any shape, regular or irregular. COLOUR is useful in Venn diagrams to show intersections and unions.

E.G. :

Here three sets intersect. $A \cap B \cap C$ is the darkly shaded portion.

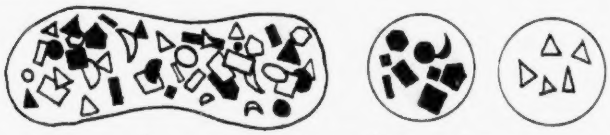


If A represents mammals, B animals of temperate zones, and, C represents hibernators; then $A \cap B \cap C$ will represent mammals in temperate zones which hibernate. $A \cup B \cup C$ will include all mammals, all animals in temperate zones, and all hibernators.

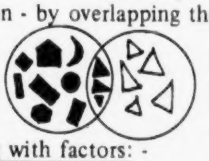
The cross-hatching shows other intersections, $(A \cap B)$; $(B \cap C)$; $(A \cap C)$.

USING SETS - to find common factors and common multiples: -

E.G.: Suppose that a child is given a number of objects of various colour and shapes, and that he is asked to put all the black objects in one circle, and all the triangles in another circle; i.e.



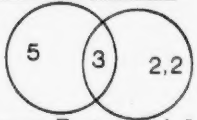
He may discover that some triangles are black, and that the only satisfactory way to deal with these, is to create an intersection - by overlapping the two circles: -



Intersection = black triangles

This same method is applicable when working with factors: -

E.G.: The factors of 15 and 12.



15 = 3, 5
12 = 2, 2, 3

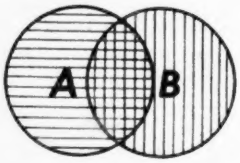
Iti is apparent that 3 is the Highest Common Factor; and 5, 3, 3, 3, (60) is the Lowest Common Multiple.

UNION OF SETS: USING NUMBER:

The Venn diagram shows the union of two sets, A and B.

The union of sets will include all members of Set A, all members of Set B, and all members of both Sets.

I.E. All the girls in the school, all members of the school-band, including all members of the school-band who are girls.



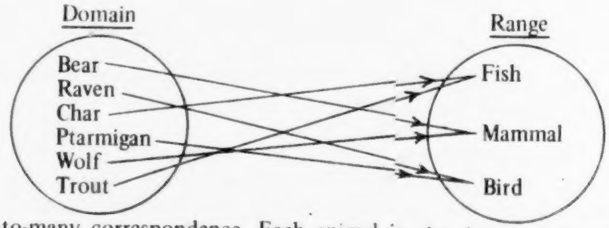
The union of sets $(A \cup B)$, will include the set of elements which are members of either Set A or Set B, or both.

If one is concerned with the numbers of members: - the equation reads: - $\boxed{n(A \cup B) = n(A) + n(B) - (A \cap B).}$

MAPPING:

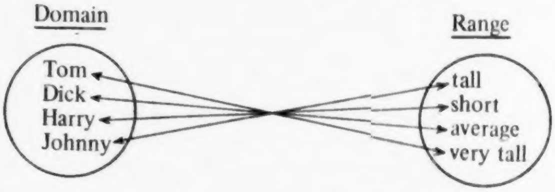
Mapping shows the correspondence which exists between members of one set and members of another set. (See Bulletin No. 3 of the Nuffield Mathematics Teaching Project).

E.G.:


Domain
Range
Bear
Raven
Char
Ptarmigan
Wolf
Trout
Fish
Mammal
Bird

This is one-to-many correspondence. Each animal in the domain belongs to one of the three sets in the range, because many arrows arrive at each element in the Range, but only one arrow leaves each member of the Domain.

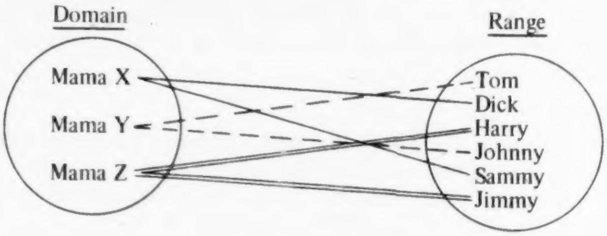
E.G.:


Domain
Range
Tom
Dick
Harry
Johnny
tall
short
average
very tall

In these sets there is one-to-one correspondence between members of the set of children (the domain) and the members of the set of adjectives describing height (the range); because one arrow arrives at each member of the Range, and one Arrow leaves each member of the Domain.

THE FOLLOWING EXAMPLE IS NOT MAPPING: -

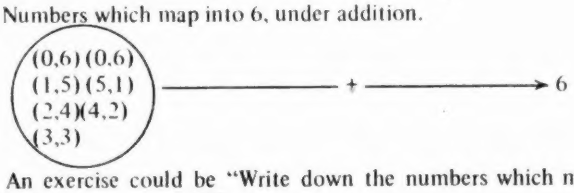
This is NOT mapping, because each element in the Domain has NOT ONE, but TWO corresponding elements in the Range: -


Domain
Range
Mama X
Mama Y
Mama Z
Tom
Dick
Harry
Johnny
Sammy
Jimmy

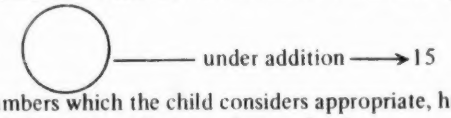
MAPPING AND TABULATION:

Pairs of numbers can be 'mapped' by children, and tabulated also. In this way, the individuality of each number 'mapped' is emphasized, and the understanding of number relationships extended further.

E.G. Numbers which map into 6, under addition.



E.G. An exercise could be "Write down the numbers which map into 15, under Addition".



After the pairs of numbers which the child considers appropriate, have been entered in a circle, he may tabulate his results in a reference book.

E.G. The following tabulation is shown for numbers to 6; it could be extended to the right, where numbers mapping into 15 would be tabulated. (Note: this does not mean that all numbers up to 18 would need to be mapped first).

There is always one pair more than the image:

0, 0	0, 1 1, 0	1, 1 0, 2 2, 0	1, 2 2, 1 0, 3 3, 0	4, 0 0, 4 1, 3 3, 1 2, 2	5, 0 0, 5 1, 4 4, 1 3, 2 2, 3	6, 0 0, 6 1, 5 5, 1 4, 2 3, 3 2, 4	Pairs
0	1	2	3	4	5	6	Image

'Mapping' under multiplication: In multiplication, the neutral (or identity element) is 1. i.e., 2x3 = 6x1.
1 does not here alter the value of the equation, 2x3= 6
Pairs will be factors.
Numbers which have two pairs and only two are prime numbers.
Note that one is not a prime number.

Currency

The harsh realities of this topic are familiar to the greater number of people; everyone is fascinated by it; everyone is to a greater or lesser extent concerned with it; and the importance of using real situations is all tooobvious! At all stages, recording is an essential part of the activity; conversations, discussions, should be encouraged; and children should be involved in as many school-money-costing situations as is feasible.

Use of Real Currency: -

We feel that real currency should be used in schools. Careful consideration should be given to the use of cardboard or plastic tokens: Note that 'token money' - when working with slower or retarded children is of little use, and only further confuses them.

A) Coins: -
- (a) Recognition of coins; names; appearance; 1 cent. 5 cs. nickel; 10 cs. dime; 25 cs. quarter; 50 cs. $1.
- (b) Experience in counting and stacking different denominations.
- (c) Sorting into bank-style coin bags.
- (d) Weighing and measuring coins; and as units of wt. & L.

B) Composition and Relationship: -
- (a) Of each coin to each other.
- (b) Fractional parts of coins and bills; $1.55.
- (c) Equivalent parts of coins and bills; $1, $5.
- (d) Experience in counting mixed coins and bills; finding totals in dollars and cents.

C) Practical Activities: -
- (a) Counting, collecting, and money changing.
- (b) Coins which will make up a given amount.
- (c) Coinage date frequency counts.
- (d) Coinage image frequency counts.
- (e) Giving and receiving change, realistic amounts; the amounts from which change is given should be made up of coins likely to be offered in a store, post office.

D) Buying and Selling Activities: - involving basic processes: -
- (a) Ordering, making shopping lists, prices.
- (b) Accounting of orders, totals, currency tendered. Change given/received.
- (c) Adding machines. Cash-register.
- (d) Bills in large denominations.
- (e) Language of money, and 'slang forms'.
- (f) Application of this knowledge to accurate calculations involving money.
- (g) Ordering from catalogues; comparative prices.

E) Money Comprehension: -
- (a) Making up given amounts of money.
- (b) With given number, or specified denominations, making up amounts.
- (c) Making change; cross-checking.
- (d) Budgeting.
- (e) Marketing.
- (f) Exchanging: second-hand values.

F) Aids to Quick Calculation: -

Pocket calculator, Ready Reckoners, Dozen Rule, Score Rule; Quick approximations: parts of a dollar as fractions; the Decimalization of money.

G) Costing School Activities: -

Costing Student Council activities.
Personal budgetting and accounting.
Bookkeeping for beginners.

H) The Post Office: -

- (a) Calculations involving stamps.
- (b) Cost of parcels per lb.
- (c) Cost of letters per oz.
- (d) Registration fee.
- (e) Money Orders and charges.
- (f) C.O.D. - sending and receiving.
- (g) Various rates; printed matter; air; etc.

I) Banking: -

- (a) Bank accounts; where, how, why.
- (b) Nature of banks, and operations.
- (c) Cheques.
- (d) Types of accounts.
- (e) Banking by mail.
- (f) Interest; simple, compound.
- (g) Loans.

J) Credit: -

- (a) Credit accounts; types, interest.
- (b) Time payments, and charges.
- (c) Discounts.
- (d) Guarantees, etc.

K) Taxation: -

Federal taxes, payments due, payments to be claimed.

L) The Relationship between Money and Measures: -

- (a) Costs per pound; per ton; etc.
- (b) Costs per yard.
- (c) Costs per gallon.
- (d) Money and time - rates for job hourly.
- (e) Money and distances, airfares, costs per mile by truck, etc.

M) Foreign Currency: -

- (a) Common appearances and names.
- (b) Rates of exchange.

(c) Canadian and U.S.A. dollar relations.
(d) Dollar and Sterling areas.

N) History of Coins: Coin Collecting.

Time

A) Awareness of Time: -

(a) Personal Time: - sleeping, eating, playing, school, birthday, age, holidays, visiting, etc.

(b) Community Time: - working days, vacation, weekend, festivals, Federal holidays. Specific hours, days, of business for local offices, stores, P.O., library, clubs, recreation centres, sports meetings, public meetings, entertainments, church services, etc. Scheduled times of aircraft, ship, trucks, buses, arrivals/departures.

(c) Time measuring devices: clocks and calendars.

(d) Relationship of amounts of time, specified days, hours - to clocks and calendars.

(e) Familiarity with clocks: - play clocks, alarm clocks, electric clocks, wrist-watches, "clock watching", dismantling defunct clocks, experience with constructional clocks. Construction of clock-faces, with moveable hands. The patterning of clock-face.

(f) Familiarity with calendars: wall, desk, rotational, leaf-turning, tearing-off types.
Checking off school days, holidays, special days, weekends, birthdays, etc.

B) Understanding Time: -

B1 The Clock:

(a) Hours; half-hours; quarter hours.
Time before the hour, (to); time after the hour; Five minute intervals.
Different ways of expressing time, e.g., 10:35/25 to 11. A.M. & P.M.
Minute Intervals.
The 24-hour clock.
Understanding 12 and 24 hour timetables.

(b) Timetables: personal, school, diaries, recording of time spent in various activities; Interpreting commercial timetables.

(c) The use of a stop-watch.
Appreciation of time in seconds.

(d) Recording of time over a measured distance. Calculation of average times.

B2 The Calendar: -

(a) Days of the week.
(b) Months of the year.
(c) Daily dates, birthdates, special dates, (Christmas Day, Remembrance Day, etc.).
(d) Correct order, spelling, abbreviations, of terms used under (a), (b) & (c).
(e) An appreciation of terms: -
Yesterday, today, tomorrow; day and night; Morning, afternoon, evening, noon, midday, midnight, dawn, sunrise, sunset.

B3 Seasonal Times: -

(a) As appropriate to geographical location.

B4 World Time: -

(a) Rotation of the earth on its own axis every twenty-four hours.
(b) The orbit of the earth round the sun every 365½ days.
(c) G.M.T.; time around the world. International Date Line.
(d) Daylight, darkness for 24 hours.
(e) Lunar cycles. Tides.
(f) Leap years, Quarters, Half-years.

B5 Interplanetary Time: -

(a) Light years.
(b) Eclipses, and other phenomena.

C) Relationships of Time: -

(a) Fractional time: inter-relationships of units of time.
(b) Time, Distance, & Motion;
Graphs of relationships;
Calculations of m.p.h. & r.p.m.
Times to walk, run, cycle, drive, - one mile.
Simple time and motion studies.
(c) Time and Weight: speed of falling objects.
(d) Time-Volume-Capacity.
(e) Time-Temperatures.

D) Historical Time: -

(a) Pre-historical time.
(b) An appreciation of the terms: -
Past, present and future;
Last year, next week, sometime;
Decade, century, millinium.
Annual, biennial, perennial;

Infancy, childhood, juvenile (minor);
Adult, old-aged, generation (30 years);
A.D. and B.C.

E) Experiments with other Time-devices: -

- (a) Sundial, Shadow stick;
- (b) Mexican Sun-calendar;
- (c) Clytemnestra.

Reference Book recommended for this type of investigation: -
"Wonderful World of Mathematics": L. Hogben: Garden City Books, N.Y.

F) Social Time and Time-Space Conventions: -

As appropriate.

Weight

A) The Use of Balance: -

- (a) Finding two objects of equal weight.
- (b) Comparison of two different weights: i.e. "heavier than", "lighter than".
- (c) Matching materials such as sand, beans, nuts, stones, blocks, etc. to each other.
- (d) Realization that bulk of differing materials is disproportionate to weight.
- (e) Weight constant, material constant, shape variable; e.g., clay.
- (f) Matching assorted materials to standard weights.
- (g) Introduction of different types of balance, weights.

B) Standard Weights: -

- (a) Ounce (oz), pound (lb), hundredweight (cwt), ton; and their relationship to each other.
- (b) Fractional parts of standard measures.
- (c) Equivalent parts of standard measures.
- (d) Conventions of measurement, spoons, cups, etc.
- (e) Differences in certain Canadian and U.S.A. measures.

C) Introduction of Different Types of Weighing Machines: -

- (a) Dial-face, horizontal, vertical, spring-balance, etc. Letter scales, postage meter, parcel scales, electrically operated scales: various types used in community.
- (b) Specific purposes and uses of certain machines.
- (c) Constructing a simple balance.

D) Personal Weight: -

(a) Weight of each individual.
(b) Comparison with friends.
(c) Average weight of children: age, sex, bone structure.
(d) Comparison of height and weight: proportion, sex,
(e) Graphing of weight over a period of time.
(f) Estimating, "the heaviest man in town", etc.

E) Weight in the Environment: -

(a) Finding the weight of objects.
(b) Measuring a fixed amount of some substance.
(c) Net weight: Gross weight.
(d) The standard set of weights.
(e) Practice with fractional weights.
(f) Calculations involving commodities bought in lbs., ozs., 2 lbs., 6 lbs., 10 lbs., cwts., tons.
(g) Activities centerd upon mail, and freight weighing.
(h) Weight of vehicles: weight load on bridges, weighbridge.

F) Relationships: -

(a) Weight and Volume.
(b) Displacement and Flotation.
(c) Weight and Gravity.
(d) Weight and Liquid measures.
(e) Weight and Movement: Friction: Power-weight ratio.
(f) Weight and Lifting: Pulleys and Levers.

G) Metric Weights: -

(a) Terminology and uses: conversion charts.
(b) Comparison with standard measures.

Linear Measurement

Accuracy of measurement is relative to the nature of the 'subject' and the purpose for which it was measured.

A) The Language of Comparisons: -

(a) Similarities - objects of the same length.
(b) Differences - objects not having the same length.
(c) Comparisons of diverse objects: thick/thin; wide/narrow; long/short; larger/smaller; etc.
(d) Improvised units of measure - blocks, tiles, string, rods, books, coins, bottle-tops, etc.
(e) Recording, discussion, extension of experiments with improvised units.
(f) Open-ended and closed assignments.

B) Personal Measurements: -

(a) Each individual's own measures must be established, and recorded.
(b) Hand-span, foot, pace, arm-stretch, nose to finger tip, cubit, thumb, head circumference.
(c) Inter-relationships of personal measurements; Cf. Lilliputians, - "once round the neck is twice round the waist", etc.
(d) Comparisons with friends.
(e) Averages, e.g., arm-stretch, charted.
(f) Comparison of averages: re: sex, age, size.

C) Introduction of Standard Measurements: -

(a) Units of measure, inch, foot, yard, rod, furlong, mile.
(b) Introduction of various measuring devices - rulers, tapes, trundlewheels, steel tapes, land-chains, surveying tapes and poles, gradient-finders, callipers, slide rules, etc.
(c) Relationship of units to devices.
(d) Uses, purposes, of devices.
(e) Conventions of linear measurement, e.g., feet for measurement, e.g., feet for measurement of wood and buildings, yards for fabrics, etc.
(f) Fractional parts, and relations of units.
(g) Inter-relationship of units of measurement.
(h) Reference charts; individual reference books.

D) Activities using Standard Measurements: -

(a) Personal measurements.
(b) Classroom fittings, fixtures, equipment.
(c) School dimensions.
(d) External environment: play-yard, P.E. apparatus, etc.
(e) Measuring horizontally, vertically, diagonally; solid and plane shapes, curves with string; etc.
(f) Charting, graphing, recording, discussion, extensions.
(g) Field trips to construction sites, observing building construction; community activities of economic base involving measurement; e.g., sizes of fish nets; boat construction; fur cutting; etc.
(h) Special Projects, e.g., classroom 'yard-goods store'; garment construction; pattern drafting; etc.

E) Further Activities with Linear Measurement: -

(a) All aspects of physical education provide the 'feel' of distance, and 'eye-judgment' practice; e.g., jumping, track events, etc.
(b) Estimating measurements, guesses to be recorded, then checked out by actual measurements, results to be

charted, graphed, discussed, extended.

(c) Comparisons of land, sea, and air lines. Comparisons of different routes, - to school, to other communities, across country, etc.

(d) Home Economics and Industrial Arts are ideal activities for the extension and application of practical mathematics.

(e) Construction of scale-models.
Drawing of plans.
Interpretation of blueprints.

(f) Surveying, simple surveying of local environs; field-work; using appropriate devices.

(g) Map-making; map reading; map symbols; examination of local survey maps; following directions; map making from collected, written information.

(h) Open-ended and closed assignments; log-books for observation recording; etc.

(i) Games; solving problems with given clues; tactical games.

(j) Problem solving: - finding the height of flag poles buildings, beacons, towers; the width of rivers; approximate size of lakes; the thickness of paper; the width and distance of trails, roads, etc.

F) Metric Measures: -

(a) Terminology and uses.
(b) Comparison with standard measures.

G) Historical and Literary References: -

(a) Awareness of these terms as they occur.
(b) An understanding of the comparisons of size, distance, etc. which is implied. E.g., "seven-league boots":"Full fathoms five...."
(c) Relationship of useage to time-scale.
(d) Relationship to other historical and literary measures: ducats, doubloons, kilderkin, etc.
(e) Biblical measures: the dimensions of the Ark; Solomon's temple, etc.

Capacity

A) Improvised Units of Measurement: -

(a) Improvised measuring vessels, e.g., plastic jars, bottles, buckets, cans; collander, funnels, tubing - provide material for experimentation, aid the child to develop his skills in handling liquids: such guided experience should lead the child to understand density, and something of the nature of liquids. Sand-trays, salt-pits, and water-wagons provide the setting for this exploration: weather permitting - soil, and mud-pies, etc.

(b) Language of comparisons, quantities, correct terminology for utensils, and actions involved.

(c) Density extended through weighing of cans filled with sand - dry, wet; bottles of water; cans of straw, sponges, feathers; etc.

(d) After experience in handling different containers, and various substances; - the results should be recorded: e.g., "4 cups fill this bottle"; real charts for reference, class activity books.

(e) Experience with vessels of equal capacity, but with different shapes; e.g., a pint bottle of water, a pint jug of water, and a pint dish of water.

(f) Experience with a volume relations set - 3D forms, for filling: using food colouring in the water, comprisons, of volume from one to another.

(g) Recording of all observations, discussions.

B) Standard Measures: -

(a) Pint, Quart, Gallon.
(b) Multiple and fractional measures.
(c) Inter-relationships of measures.
(d) Utensils of standard measure.
(e) Recorded activities to establish relationships between units of measurement.
(f) Discovery of exact capacity of vessels. e.g., "this bottle holds 1-½ pints".
(g) Estimating amounts, recording, checking-out.
(h) Practice with fractional measures.
(i) Conventions of liquid measurement; pints, quarts of milk; fluid ozs: medicine bottles; dosages by spoonfuls; barrels of gasoline = 45 gallons, etc.

C) Application of Standard Measures: -

(a) Housekeeping, shopping, travelling activities, etc.

D) Relationships: -

(a) Capacity and Weight: (1 pt. water weighs 1-¼ lbs.)
(b) Capacity and Distance: (calculation m.p.h.)

E) Metric Measures: -

(a) Relationships pint/litre.
(b) Relationships litre/gallon. Etc.

Temperature

A) Informal Experiences: -

(a) All children, through their personal experiences, are aware of the difference between hot and cold.
(b) Putting hands in cold, tepid, and warm water - to establish the relative nature of subjective estimates of temperature.
(c) Discussion of reactions to different temperatures; the establishment of relative values.
(d) Observations of ice, water, and steam: making ice cubes in the refrigerator; out doors; boiling water; steaming point.
(e) Simple experiments in evaporation and condensation.
(f) Discussion, observation: simple charts and scales can be produced - e.g., adjustments of the "zipper" thermometer: simple radial plans showing loss of heat as the subject moves further from the source of heat; also simple scales showing ice, water, and steam.
(g) Scale depends on what we are measuring, and because the senses are not reliable in measuring temperature accurately, the thermometer should be introduced at the earliest stages.
(h) The concept of heat and its temperature will develop slowly in the child's mind; but practical experiences of measuring temperature in degrees, Centigrade; and recording of these graphically, will assist the process. It is essential that children have the opportunity to explore heat in their everyday world.
(i) Experiments, observations, through such topics as: - seasonal temperatures; heating in home and school; thermostats; hot and cold beverages; washing; cooking; candy-making thermometer; effects of heat on colour; sprinkler systems; animal adaptation to climate; clothing appropriate to body temperature/seasons, etc.

B) Introduction of Specialized Thermometers: -

(a) Centigrade/Fahrenheit: comparisons/conversions.
(b) Air temperatures: - wall, maximum and minimum, circular, wet-dry bulb.
(c) Immersion - liquids.
(d) Earth thermometer.
(e) Clinical, humans and mammals.
(f) Thermostats in appliances: heating systems.
(g) Thermister, leaf and tree temperatures.
(h) Barometers, hygrometers, etc.
(i) Comparisons of scales/purposes of thermometers.
(j) Exploration of Directed Numbers, and Negative numbers.

(k) Calculation of wind-chill factor.
(l) Effects of temperature on fuel oils, engines, aircraft; de-freezing frozen machines; use of 'Herman Nelson', etc.

C) Relationships of Temperature to: -

(a) Local Climatology; school weather station.
(b) Home Economics; Home Nursing.
(c) Industrial Arts; metal craft.
(d) General Sciences: Social Studies.
(e) Field trips to M.O.T. stations.

Volume

Volume is the measurement of space enclosed by one or more simple surfaces; it is named by a numeral; and it is measured in 'cubic units'.

A) Relationship to Spatial and Intuitive Geometry: -

(a) Sorting, packing, experimenting with 3D solids.
(b) Modelling of 3D solids with clay, assorted plastics.
(c) Attributes of 3D solids: faces, angles, verticles.
(d) Language of comparisons, and spatial regulations.
(e) Dismantling of 3D shapes to discover net.
(f) Construction of 3D shapes - using toothpicks, wire, straws, cardboard, etc.
(g) Construction of Archimedean solids: stellated solids.
(h) Volume of pyramids.
(i) Photographing/sketching of constructions built: Viewing from different angles.
(j) Recording, discussion and extension of all activities.

B) Activities to Promote Understanding of Cubic Units: -

(a) Building and packing assorted boxes, trays, etc., with 1" cubes. Comparisons: Number.
(b) Using 1" cubes to build up 2½" and 3" cubes.
(c) Developing the 12" cube: i.e., 1 cubic foot.
(d) Growth of Cubes. The Series 1, 3, 9, 27, 81....
(e) Volume of prisms and cuboid shapes by actual unit construction with unit cubes.
(f) Discovering the relationship. V = 1. x w. x.h. (V = wh).
(g) Relationships between circles, and the volume of cylinders and spheres.
(h) Recording: - graphs, charts, etc.: discussion.

C) Experiments and Recording to establish: -

(a) Relationships between Volume-Weight-Capacity.

(b) The effects of Pressure and Temperature on volume.
(c) Relationship of volume and surface-area.
(d) Relationship throughout to Number and operations.

D) Introduction of Metric Measures: -

(a) Familiarity with metric measures.
(b) Comparison with standard measures.
(c) Operations with metric measures.

E) Further Activities with Volume: -

(a) Uses in the environment - domestic, school, store.
(b) 'Cubic capacity' re: engines, cf. 'horse power'.
(c) Experiments in elementary physics.

Area

A) Exploring the Concept of Area: -

(a) Covering space: paint, collage, crayons; table covers, carpets, blankets, clothing; curtains; all types of practical activities in the environment, particularly with art and craft materials.
(b) Use of mosaic puzzles: floor and table; pattern boards; shapes boards; etc.
(c) The idea of the same area in a different shape; e.g., using tangrams.
(d) Tiles of different shape, or size; tiling activities; recording number and shape/size over specified areas.
(e) Making enlarged shapes; pantograph.
(f) Improvised units for measurement of a whole area: e.g., a book cover, "How many to cover this table?". Cf. stamps, cards, bricks, tiles, coins, equilateral triangles, squares, pentagons, etc.
(g) Relationship of shape to area: "Which is the most convenient shape for this area?"
(h) Recording, discussion, extension; comparisons: e.g., over specified area: "Tom used 100 tiles; Dick used 500 stamps; and Harry used 50 bricks".

B) Introduction of Measurement of Area: -

(a) Measurement of space covered.
Irregular shapes, curved shapes.
Retangular shapes.
(b) Using squared paper, and geoboards to find area of rectangles, triangles, circles, polygons, ellipses - any irregular or rectangular shapes.
E.g., "I have covered 10 squares and 10 half squares".
(c) Fractional measures of shapes, and units used.

(d) Use squared-paper and geoboards to make different shapes with the same area.

C) Standard Square Measures: -

(a) Accurate recording.
(b) Square inch; square foot; square yard; acre; square mile.
(c) Relationship of standard units to each other.
(d) The relationship between the length of sides and the area of regular and irregular figures. Perimeter and circumference.
(e) The effect of doubling sides of squares leading to square series 1, 4, 16, ...: 9, 35, 144, ...
(f) Areas of triangle, trapezium, pentagons.
(g) Areas of circles, and curved surfaces, e.g., spheres, globes, balls, etc.

D) Activities using Standard Measures: -

(a) Measurement of retangular areas in school environs.
(b) Surveying of large regular and irregular areas.
(c) Triangulation.
(d) Density of houses per acre.
(e) + activities listed under 'Linear Measurement' sections D & E.

E) Relationship to other types of Measurement: -

REPRESENTATION: SUGGESTED TOPICS (Not necessarily in order of difficulty.)		R = Real Chart P = Pictogram B = Block Chart (Column) L = Line Graph PC = Pie Chart PS = Percentage Strip
1. Personal Details	height, shoes, mitts, gloves, weight, eyes, hair, clothes, size of family. Distribution of birthdays by month, class - boys, girls, family.	R., P & B
2. Weather Recording	type (Sunny, etc.), temperature, wind, snowfall; rainfall; wind chill	L. R. P
3. Growth	height and weight over a period, growth of plants and animals.	R. P., L.
4. Favourites	food, clothing, colours, toys, activities, books, stories, films, games, friends, records,songs, places, hobbies, clubs - Cubs, Brownies; lessons, candy, etc.	R., B., P
5. 'My Day'.	rising and bedtimes, hours of sleep, hours asleep, eating, playing, visiting, school, store, etc.	B., PC., PS
6. Employment.	parents, siblings, kinfolk; community employment agencies; on the land; in the 'south'.	P., B., PS.
7. Spending Money.	amounts, how spent.	P., B.
8. Simple Vehicle Census.	items of traffic passing given point for 15 mins. daily.	P., B.
9. Family Transport.	skidoos, dogs, trucks, sleds, canoes & peterheads, skiis, snowshoes.	P., B., PS.
10. Community Vehicles.	oil-truck, fire-truck, water-trucks, bombardiers, ambulance, pick-up trucks, heavy trucks, snow-movers, cranes, boats, etc.	P., B.
11. Air-traffic Census.	days, arrivals, departures, destinations, mail, passengers, freight, type of plane, if refuelling; helicopters, etc. field-trips to P.O., D.O.T., Air-strip/Terminal; Ticket agents.	P., B., PS. PC.
12. Community Sports Activities.	curling, ice hockey, football, seasonal races, skiing, meetings, clubs,associations, classes, dances, film-shows, Guides, Scouts, School teams.	P., B., PS.
13. Newspapers, Magazines, & Catalogues	most popular; frequencies of letters, words, pictures, styles, comparative prices. Frequencies, inches, on special events.	P., B., PS.

REPRESENTATION: SUGGESTED TOPICS (Not necessarily in order of difficulty.)	R. = Real Chart P. = Pictogram B. = Block Chart L. = Line Graph PC. = Pie Chart PS. = Percentage Strip
1. Shadows: length at different times of the year; length at different times of the day; daylight and darkness.	R., B., L.
2. Temperature: same time daily; hourly; maximum and minimum sunshine; shade; compare with other settlements in N.W.T.; compare with various world locations. Winter temps. (introduction of negative numbers.)	B., L., PS.
3. Rainfall: daily, weekly, monthly, home, N.W.T., Canada, world.	B.
4. Wind Pressures: Anemometer, Ventimeter, Beaufort scale.	B.
5. Barometric Pressure: weather comment.	B.
6. Accident Statistics: time of day/year/months; causes of accidents.	B.
7. Probability: throwing coins; dice; turning cards.	B., L.
8. Prices/Taxes: over a period of time; use of money paid.	PC., PS., B.
9. Rates of Change: proportion & conversion; no. relations currency; $/quarters; qtrs./cents; length/weight; time; capacity: conversion graphs; dollars; temperature; cost graphs; credit payment graphs; graph to illustrate (plot cmf. & diam).	B., L.
10. Population: local settlement; N.W.T.; S. Canada; world population; population growth.	B., L.
11. Electricity - Fuel Oil: consumption; home; school; daily - weekly; monthly - yearly.	B., L.
12. Area: school, home, settlement; playground; mining claims; N.W.T. total; parks.	B.
13. Comparison: length of life of animals/humans; speed of birds/animals/humans running; length of jumps of animals/humans.	B.
14. Hunting: caribou/meat yield; (cf. moose, seal, walrus, whale, birds). Animal/hide or skin yield; prices paid. fishing, numbers types caught.	P., B.
15. Performance: of skidoos; of dogs; individual events; group contests - prowess in sports; dancing; academics; production; etc.	B.
16. Highest: mountains, cliffs, trees, towers, buildings, poles, etc.	B.
17. Natural Science: insect life per sq. ft; grasses per sq. yd.; flowers: (hoops make useful improvised unit); density of trees.	P., B.

MAJOR CONCEPT TWO

SHAPE. SPACE, AND MOVEMENT.	1	2	3	4	5
A) Solid Shapes, (3D)					
- sphere, cylinder, cone, simple and irregular and regular polyhedra.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- characteristics, identification, naming.	oxoxo	dxdxd	dxdxd	dxdxd	txtxt
- inter-relationships of 3D shapes.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- relationships of shape to weight/ volume.		oxoxo	dxdxd	dxdxd	txtxt
- number relationships.		oxoxo	dxdxd	dxdxd	dxdxd
- classification of shapes in environment.	oxoxo	oxoxo	dxdxd	txtxt	xdxd
- recording of observations & activities.	xxxxx	xxxxx	xxxxx	xxxxx	xxxx
B) Plane Shapes (2D)					
- simple regular & irregular polygons.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- circle, ellipse.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- characteristics, identification, naming.	oxoxo	dxdxd	dxdxd	txtxt	txtxt
- inter-relationships of 2D shapes.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- number relationships.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- classification of 2D shapes in environment.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- recording of observations & activities.	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
C) Relationships of 3D and 2D shapes					
- faces, edges, vertices, angles.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- 3D shapes deformed into 2D shapes.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- 2D shapes re-formed into 3D shapes.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- relationship to movement.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
D) Space Relations					
- language of spatial relations.	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
- inter-relations with 3D and 2D shapes.	oxoxo	oxoxo	oxoxo	dxdxd	dxdxd
- relationship to number & measurement.	oxoxo	oxoxo	oxoxo	dxdxd	dxdxd
- relationship to movement.	oxoxo	oxoxo	oxoxo	dxdxd	dxdxd
E) Movement					
- from one point to another.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- line segments, open & closed curves.		oxoxo	dxdxd	dxdxd	dxdxd
- movement of points under a control.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- gravitational controls over point mvt.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- rotational movement.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- measurement of rotational movement.			oxoxo	dxdxd	dxdxd
- inter-relationships of measurement.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- inter-relationships of number.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- inter-relationships of shapes and space.	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- position.	oxoxo	oxoxo	oxoxo	dxdxd	dxdxd
- symmetry.	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
Extensions					
- the sphere.					
- perspective drawing.					
- longitude and latitude.					
- intuitive topography.					
- constructions.					
Problem-solving, Field-work	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Games, Puzzles.	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx

SHAPE, SPACE AND MOVEMENT

As from birth, the child lives in a world of shapes, space and movement; his knowledge of these is first-hand, - developed long before he enters school. Once at school, this knowledge is developed and extended, not only in mathematics, but in every area, in each phase; in play; and throughout the daily activities of life. Creative work with clay is particularly valuable, as the child may change shapes, or cut into them as he wishes; - thus developing insight into, and prime experience with, shapes.

In mathematics, we should attempt to encourage the further exploration of these aspects of their world, and help children to see the mathematical significance of their experience; to make explicit that which, in many instances, is implicit. To achieve this, it is necessary to provide the children with the appropriate language; and to give them opportunities to use this language. Much of this language and experience of what it means, can be given greater significance if it is used throughout the school programme; and in the earliest stages should be an integral part of physical education and dramatic activities.

It is suggested that, throughout this work the starting point should be the child's environment, both natural and man-made; it is an understanding of this environment by the child that we are seeking to develop. In the shapes and patterns of the child's everyday world: - in the economy of the sphere of a ball, and the parabola of its path when thrown, - into a can, a right circular cylinder formed by revolving a rectangle about one of its sides as an axis: in the spirals found in shells and screws: - there is opportunity enough to excite and enhance the mind of every child. If the child is given encouragement to find shapes, to discover their characteristics, is given opportunities to experiment with them, to ask questions, to solve problems concerning them, - he will be gaining an insight into his world; an insight which will fascinate him, and cause him to wonder for the rest of his life.

We have suggested some of the fields which children could be encouraged to explore in detail; but these are only starting points, and further developments should be followed to meet the interest of the child, or a group of children. The suggestions made in this section have been arranged under headings; this is for convenience of presentation, not because they should be treated separately or in this sequence; any one experience and follow-up may provide the child with further insight into all of these aspects. No set progression is implied by these headings, as each child will approach this work with a different background of experience and development. Neither is it suggested that a starting point should be used once and then left; a return to a starting point may provide new and useful exploration as the experience and maturity of the child develops. In these activities the exploratory and creative experience should give rise to conversation and discussion; to measuring and recording. The purpose throughout should be the extension of the child's understanding of relationships.

Solids And Surfaces

A) Organized Activities for Exploration and Introduction: -

(a) Imaginative use of clay, plasticene, dough and, other plastic materials: provides involving experiences, starting points, and forms a basis for discussion.

(b) Making collections of various 3 Dimensional objects; e.g., balls, boxes, cans, blocks, cones, beads, etc., followed by simple classification into sets.

(c) Informal introduction of language of spatial relations.

(d) Shape and Volume relations: e.g., packing a given container with regular polyhedra; diverse 3D shapes, or assorted classroom equipment: e.g., Poleidoblocs.

(e) Relationships of 3D solids to each other: e.g., experiments in packing and stacking.

(f) Introduction of 3D solids, using standard models: familiarity through handling and discussion: irregular and regular solids.

(g) Characteristics and naming of 3D solids.

(h) Informal comparisons of characteristics.

(i) Conservation of Weight and Volume: e.g., modelling a series of different shapes from the same piece of clay.

(j) Recording: each model should be photographed, sketched or a written list compiled of a series of changes, with a series of changes, with a series of notes, etc. It is recommended that each child should have a folder of his own records, notes, observations, photographs, etc. E.g., with a piece of clay, of a specified weight - it was rolled into a sphere; the sphere was rolled into a cylinder; the cylinder was rolled into a long coil, a pot was made from the coil: recording at each stage: then the clay was re-formed ...e.g., series of prisms.

(k) Introduction, naming and characteristics of 2D shapes; i.e., plane surfaces: e.g., circle, trapezium, rhombus traingle, ellipse, rectangle, square, etc.

(l) Mosaics, all types of tiling activities, blocks, shapes and pattern boards, geoboards, puzzles, art and craft media, etc. - provide opportunities for exploration and first-hand experiences.

(m) Relationship of 2D surfaces to each other: comparisons; matching, sorting: developing an understanding of area, e.g., covering a given surface with octagons/circles/rectangles, traingles, etc.

(n) Relationships between 2D and 3D shapes: i.e., the faces, edges, and vertices of 3Ds, - and the sides and angles of 2Ds.

(o) Practical activities to establish 3D and 2D relations: e.g., through paper-folding; Origami; the cutting-up of 3D models (esp. clay), to show conic sections, hyperbola; the dismantling of boxes, etc. to examine the 2D pattern.

(p) Constructional activities with 2D and 3D shapes: e.g., using straws, toothpicks, pipe-cleaners, plastic strips.

Defining 2D and 3D shapes emphasizes the lines and boundaries, the exploration of which will lead to angles, parallels, and perpendiculars; e.g., 3Ds into flat nets (2D). Curved shapes: problems, e.g., Can a sphere be cut so that it lies flat? Cf. balls made by joining three flat strips: peeling oranges.

(q) Inter-relationships of 2D and 3D shapes, established by deforming constructed shapes, then by re-forming: e.g., a rectangle reformed as a parallelogram: a square into a rhombus: a cylinder into a rectangle, etc.

(r) Space and its relation to 2D and 3D shapes, - around them, between them; i.e., "holes" or "gaps". E.g., Styrofoam packing cases; between wheel-spokes; a space of a door. Space relations and environment - see 'Volume section'.

(s) Exploring pattern; space in pattern; creating patterns; repetitive patterns: e.g., "O.G." patterns; using a Spirograph kit; paper-cutting activities.

(t) Recognizing and classifying shapes, 2D and 3D, in the local environment, - school, home, store, offices, and other familiar places in the community.

(u) Viewpoints: shapes change when viewed from different angles: e.g., setting up a group of objects, then photographing/sketching them from different angles. Seeing things "as they are" as opposed to seeing things as "one knows them to be"; e.g., how does a piece of paper appear 'edge on'? The imaginative and comic - potential in this type of investigation is stimulating. Comparison of viewpoints: - eye levels of a baby, a small child, an adult. Perspective. Optical illusions.

(v) Throughout all activities: - consolidation through recorded observations, photographs, plans, diagrams, charts, sketches, graphs, and discussion: provision for individual, group, and class records. Stimulation of skills or topics which will provide further extension, and motivation.

B) Inter-relationships with: -

(a) All forms of measurement: e.g., graphing relationship between fixed volume and minimum surface area; etc.

(b) Number and Operations.

C) Further Explorations: -

(a) Shape and pattern in Natural Phenomena: e.g., in petal, leaf, branch, and seed arrangements: animal-markings, tracks, migration patterns, skeletons: rock formations, rock/snow/ice crystals, gem-stones, staking and pipeline patterns: shells, pebbles, fossils: erosion, etc.

(b) Design in the community: houses, churches, schools, oil-storage tanks, bridges, etc. Repetition of certain shapes - rectangular prisms; triangles, cylinders. Comparisons, purposes; stress on bridges, etc: Possibility of constructing a geodesic dome?

(c) Traditional/Historical uses of shape and pattern: e.g., igloo, log-cabin, teepee; string-figures, bead-patterns; quills, furs, feathers; fish-nets, clothing etc: use of tattoo marks.

(d) Human shape, bones, skulls, etc.

(e) Relationships throughout the school curricula.

D) Deductive Geometry:

Space

A) Exploring the concept of Space: -

(a) Through a programme of physical body movement.

(b) Working with plastic materials: e.g., clay, dough, putty, sand, mud, soil, plasticene, etc.

(c) Experimenting with assorted stacking apparatus: e.g., Russian pyramids, shapes, boards, stacking of nesting apparatus, etc.

(d) Filling assorted containers, cartons, crates, - with e.g., blocks, diverse objects of assorted shape and sizes.

(e) Discoveries of most useful shapes for filling cartons, cylinders, boxes, etc.

(f) Block-building: cubes, prisms, pyramids, spheres, cones, arches, wedges, etc.

(g) Experiments with hollow forms from styrofoam packing cases; specialized pre-formed packing containers; packing unpacking, investigating alternatives.

(h) Throughout all activities, developing and providing opportunities for the language of spatial relations: e.g., near/far; around; under/over; beside/behind; etc.

(i) Extending and applying the language of comparisons: e.g., too small; too little; big; not big enough, more; etc.

(j) Estimating and judging by "eye": e.g., how many cubes to fill this carton? Guesstimating, recording of the estimated numbers: checking out by actually filling and counting. Later development into volume.

(k) Discussion, recording of all activities, observations.

(l) Relationships to number, linear measurement, weight, time, volume, area, temperature, shape, and movement.

(m) Inter-relationships of space: e.g., time/distance.

(n) Exploration of acoustic space: listening, noise, non-noise, silence, decibels; adjustment and tuning of 'volume' sign on various machines.

B) Position in Space: -

(a) Co-ordinates; Ordered-pairs: use of co-ordinates and ordered pairs: helping the development of counting natural numbers to real numbers: -

E.g. (1): By finding positions in classroom, meetings, theatres, etc. by numbering rows and columns.

E.g. (2): By drawing letters, symbols, faces, shapes, on a grid, in ordered pairs, marking the co-ordinates.

E.g. (3): As a group activity, using a grid, marking a line of points; adding intermediate (fractional) points; establishing that it is a set of real numbers; finally, joining by a line segment.

(b) Coarse griding of school grounds, town plans, etc. Grids for enlarging and distorting. Triangulation. Understanding maps. 3D positions; scale drawings; use of a clinometer.

(c) Imposing one grid on top of another, to produce Moire patterns: interference patterns: interference patterns. Practical experiments with assorted netting, and lace curtains. Grids used in colour printing.

(d) Time used to fix position: e.g., when a point is moving at a uniform speed over a fixed path: consideration of the inter-section of the paths of two moving objects: different viewpoints and speed; radar/radio "fixes" on positions and speeds of moving objects. - sea/air/land.

Movement

A) Movement of Points: Fixed Points: -

(A.1) (a) Movement of a point produces a line: e.g. scribble patterns; curved lines; vertical, horizontal, and diagonal lines. Control of movement developing naturally, stimulated by a variety of materials; e.g. paint, charcoal, chalk, pastel, etc., on sugar and cartridge paper, etc.

(b) Development of intuitive geometry; - through "path-making"; i.e. sets of points leading from one to-another. Observation measurement, recording; e.g. the shortest distance between two points is the "straight path"; i.e. line segment; simple closed curves. Practical path-making e.g. using Kinder-City model with string to trace and measure paths; using string of paper; solving and creating mazes.

(c) Through activities with open and closed curves, developing the understanding that a geometric figure is a set of points forming a boundary: e.g. using cardboards strips of assorted lengths, and glue - creating triangles; the nature of a triangle (three line segments and one interior region); comparison and discussion of various triangles produced naming characteristics, and recognition of triangles - scalene, equilateral, etc. Extending to quadrilaterals: circles, ovals and ellipses.

(A.2) (a) Movement of points under a control: -

E.g. (1) Opening and closing of hinged lids, doors, and flaps, etc; finding and recording examples.
E.g. (2) Exploration of knots, braiding, and knitting; through knot-tying, braiding, and knitting of various types; making books of samples, purposes; comparison of strengths and weaknesses of knots, stitches, and weaving.
E.g. (3) Curved-stitching, and its relation to curved-line graphs, with their control of movement point. Creating stitch-curve patterns, using coloured thread and cardboard; using strong thread on a nail-frame.

(A.3) (a) The force of gravity exerts control over the movement of a point: - e.g. throwing a ball; Cf. with trajectories and space-flight.

(b) Movement and lines produced through: - rebounding of balls thrown at a wall; rebounding of ball rolled to a wall; movement of a biased ball; bouncing patterns; these can be explored, observed and recorded. (Extension into light and reflection; effects of pressure and speed). Common, Curtate, & Prolate Cycloids.

(c) Movement of a point can be seen in using a pendulum, where gravity and a fixed-point control the line that is produced. Exploration of the pendulum; e.g. variation of time-swing; control investigated and a 'second" pendulum made; comparison with metronome and gyroscope.

(A.4) (a) Rotational movement: - one point moving around a fixed point, at a fixed-distance produces a circle. Exploration of rotation movement through : physical education; spinning-tops, windmills, wheels, etc., using improvised templates (cans, etc.), for drawing circles; using string and cardboard-strips for circle construction, - the strip will emphasize the idea of fixed-radius; creation of "petal" and hexagonal patterns; further explorations through art and craft media and designs. Use of spirograph kit - for patterning activities.

(b) Introduction of the compass. Procedures for useage. Measurement using callipers. Drawing of interference patterns, i.e. overlapping concentric circles.

(c) The relationships between diameter, radius, and circumference should be explored; the value of π established by practical and graph-work, as "a bit more than three".

(d) The area of a circle should be approximated, by counting on squared-paper; or as a large number of small triangles.

(e) The relationship between the circle and 2D shapes, e.g. pentagon, hexagon, octagon; and the angle at the centre of the circle subtended by the sides of these shapes, can be observed and noted.

(f) Examples of the use of circles in everyday life, these should be collected and recorded: e.g. gears, pulleys, wheels, coins, etc. Frequency counts involving the occurance of circle formations in games and dancing.

(A.5) Electricity, radio, radar, through sine curves and alternating current; could provide further extensions.

B) Measurement of Rotational Movement: -

(a) Awareness; directionality; and the language of spatial relations: e.g. "turning" - left, right, around, over, right-around, upside-down; etc; e.g. "turning of", clock-hands, handles, hinges, compass-point, taps, etc.

(b) Establishing the need to measure movement of turns, e.g. "How far to the left?"

(c) Introduction of fractional measures; half-turn; quarter-turn; three-quarter turn; complete circle. Relationship of these to the right-angle in 2D and 3D shapes.

(d) The use of the right-angle in manufactured objects; the idea of horizontal and vertical; the use of the plumb-line and spirit-level.

(e) Angles in the environment which are greater than/less than a right-angle; - leading to a need for the specific measurement of angles. Pattern work, using - care/plastic strips and paper-fasteners, can be explored; -0° -360°. Introduction of the terms: - acute and obtuse.

(f) The 360° circle. (relationship to time). Angles of 45°, 60°. Introduction of the protractor; making a simple 10° protractor; half-circle; full circle protractors; the use of set-squares. Using 2D shapes within a circle, leading to surveying, triangulation, and plane-tabling.

(g) Navigation of ships and aircraft. Need for accuracy. Increase of error with increase of distance from the original point.

(h) Rotational movement round two fixed points; e.g. at the apex of a triangle, formed by a loop of string, the two fixed points being held by thumb-tacks; with a pencil - an ellipse is formed.

(i) Exploration of spirals; introduction of the idea that distance from a single fixed-point is infinitely variable; e.g. creating spirals by wrapping string, when unwound the pencil draws a spiral. Variations by varying the diameter of the fixed rod. Archimedes spiral, produced by drawing a line across a spinning disc. Environmental collections of shells, springs, screws, records, pine-cones, etc. (Real objects, photographs, sketches, notes).

(j) Exploration of a helix; i.e. the movement of a point round the outside of a cylinder. e.g. the screw thread on nuts and bolts; springs, cardboard rools, paper straws, and so-called "spiral staircases".
Environmental records, observations.

C) Extension of Movement Using 2D Shapes: -

(a) Movement of a square or rectangle, up and down, traces the shape of a prism.
(b) If a rectangle is rotated on one of its sides, a cylinder is traced.
(c) A right-angle triangle can rotate to trace a cone.

D) Inter-relationships with: -

(a) All forms of measurement-relations.
(b) Number and Operations.
(c) Solids and Surfaces.
(d) All aspects of school curricula.

E) Deductive Geometry and Trigonometry

REPRESENTATION: SUGGESTED TOPICS: -	R. = Real Chart. P. = Pictogram. B. = Block Chart. L. = Line Graph. PS. = Percentage Strip. PC. = Pie Chart.
1. Movement: - (1) Bounce of ball from varying heights.	R. B. L.
(2) Miniature car/ball etc., running down a slope; distance/time.	L.
(3) Length of elastic band/weight.	L.
(4) Time beats of a pendulum/varying.	L.
(5) Weight in air/weight in water.	L.
(6) Walking, running, cycling, skidooing - along the same road/airstrip/or track, varying times of departure; distance/time of day.	L.
(7) Collision graphs; timetables; distance/ time of day.	L.
2. Co-Ordinates: - Child's position in classroom; games; grid references; map work. latitude and longitude.	Plot
3. Radio/T.V./Cinema Show: - Popularity of programs; analysis of program content; comparison of various channels, stations; analysis of time for and types of commercial adverts; news, etc.	B. L.
4. Curved Line Graphs: -	
(1) Type: y=x: e.g. area of square/length.	C.L.
(2) Type: y - x: e.g. volume of cube/length of edge.	C.L.
(3) Type: xy = c (constant product relationship) e.g. width/length of a rectangle of constant area.	C.L.
5. Curve Stitching: -	C.L.
6. Other Curves: - e.g. tide times; cooling graphs; temperature/ time.	C.L.
7. Historical Events: - Time scale: B.C./A.D.; length of reigns, governments.	B.
8. Frequency Counts: - Shapes, sizes, colours, in all types of materials, and the environment.	P. B.

Symmetry

The idea of symmetry develops early during the exploration of shapes, space, and movement; its three aspects are quickly appreciated: - i.e. reflected, rotated, and translated symmetry.

(a) Reflective Symmetry: - i.e. "the mirror image".
E.G. cutting folded paper; ink blots on folded paper; axis of symmetry seen through three dimensional shapes, perceiving that more than one plane of symmetry is possible; an idea of infinity - considering the total number of planes of symmetry of a circle or sphere.

(b) Rotational Symmetry: - i.e. "the same from many angles".
E.G. handling and viewing a cube leads to the realization that it appears the same from many angles; i.e. a regular hexagon rotated through 60° appears the same.

(c) Translated Symmetry: - i.e. "repeating patterns".
E.G. symmetry in nature, wings, limbs, etc.; printed patterns; making and printing of repeating patterns through lino-cutting; potato-patterns, simple screen printing.

(d) Comparison of symmetric and asymmetric shapes, movements, etc. Aesthetic considerations of symmetry.

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NOTES RE. GEO-BOARDS: -

These are wooden boards, marked with grids, each point has an upright nail; line segments and curves can be made, in any direction, using coloured elastic bands; shapes, etc., can be superimposed on each other. Some geo-boards have grids of 1" squares; or concentric circles with the nails arranged to give 19° angles at the centre; also assorted grids for polygons. A "Multi-board" was designed for Nuffield Math. Project, i.e. a multi-purpose geo-board which could provide the basis for a great variety of mathematical experiences in numerical and spatial relationships.

Geo-boards provide a basis for work involving: -

2D shapes; Area; Perimeter; Symmetry; Curves; Scale-drawing; Position; Co-ordinates; Proportion; Ratio; etc....

Obviously, the subjects listed above cannot be fully explored or studied by geo-boards alone; we are merely suggesting that they are useful tools with which to approach this exploration; because -

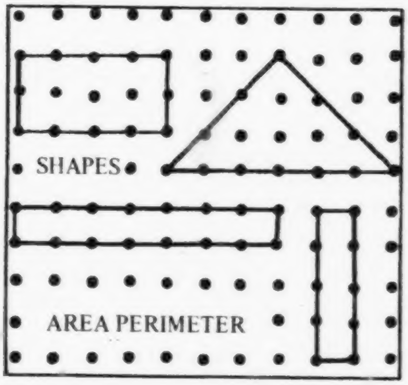
(a) they provide physical involvement, they can be made by children;
(b) errors can be easily and effectively adjusted;
(c) relationships can be clearly shown;
(d) speed in building up shapes and relationships;
(e) work carried out on a 1" grid can be easily transferred to 1" squared paper;
(f) they provide another opportunity for individuals and groups to work on open-ended and closed assignments.

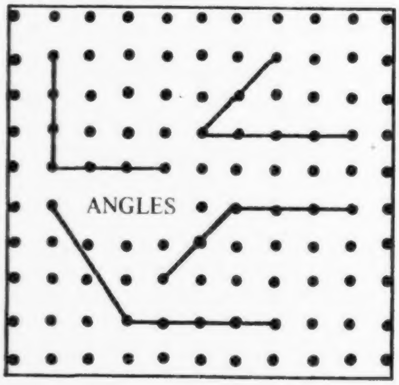
RECOMMENDED REFERENCE BOOK: -

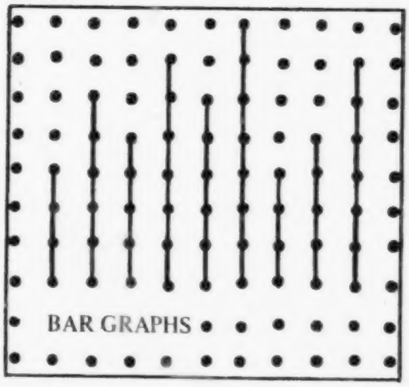
"Adventure with Shapes". Raviellie (Phoenix).

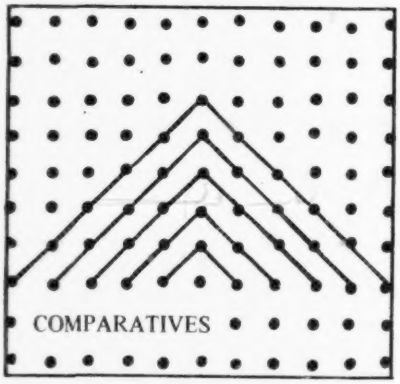
PEG-BOARD POSSIBILITIES: -

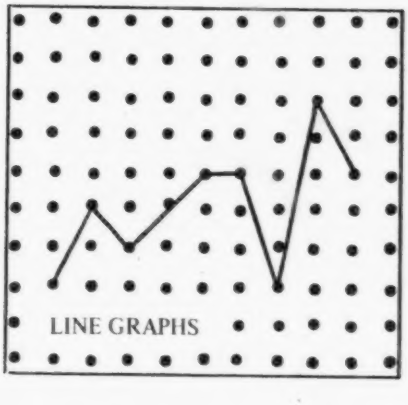
Using plastic bands or twine with masking tape for legends, etc. i.e. patterns of numbers, numerals, symbols and relationships; shapes.

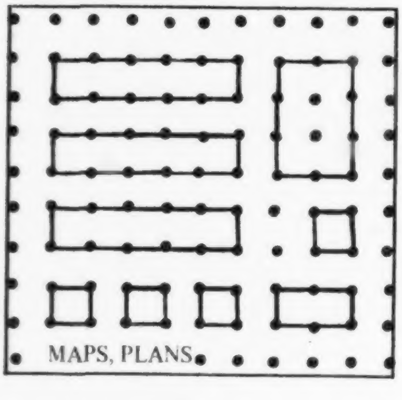

SHAPES
AREA PERIMETER






COMPARATIVES


LINE GRAPHS



NUMBER AND RELATIONSHIPS

In the young child's experience of number, we can see the growing awareness of "one, two, and many", of cardinal and ordinal numbers, as the fingers are extended one by one to indicate "fourth". The child observes differences, then similarities, (inequality/equality); in counting beads, rocks, marbles, blocks, etc., (cardination); then in arranging objects in order of size and finding "first, second.." in a series; (ordination & seriation); in matching and patterning with blocks, etc., in pairs, discovering "one over"; (odd & even numbers); and in groups; (equivalent/non equivalent). Simultaneously, the child's curiosity about shapes and sizes of objects in developing; (spatial relations); understanding ideas which will extend into measurement relations, space, and movement; throughout all exploration, active participation and the development of language are of paramount importance.

Number relationships are logical in conception, precise in form, and permanent in character; these are the disciplines of mathematics to which, traditionally, considerable time and effort in memorization have been expended. A superficial fluency in the performance of computations and number-figuring operations, may be achieved through note-learning; however, real success in number can only be developed through an understanding of relationships. The understanding of number and its relations is gradually developed through: -

(a) Exploration and experience in a relevant situation; a situation designed so that the child is able to discover significant relationships; a situation which provides directed-experience and teacher-guidance.

(b) A development of concepts and their expression in language; and purposeful recollection.

(c) The organization of experience, the understanding and verbalization of concepts, together with their practical and abstract applications and associations.

We feel that teachers are well-acquainted with the mathematical principles of properties of number and its relationships; however, we would suggest that these reference books should be readily available in each school: -

"Today's Mathematics"; J.W. Heddons: (S.R.A. Nelson & Sons).
"Basic Concepts of Elementary Mathematics": Schaaf: (General Pub. Co.)
"Key Topics for Primary Teachers"; (G.C.M.P./S.R.A.: Nelson & Sons)
"Extending Mathematics Understanding"; Osborn et al: (Nelson & Sons)
"Exploring Mathematics on Your Own"; Johnson/Donovan/Glenn: (Doubleday)
"Growth of Mathematical Ideas", K-12: National Council of Teachers of Mathematics. 24th Year Book.
"Primary Mathematics"; Z.P. Dienes: (Macmillan)

MAJOR CONCEPT THREE

NUMBER AND RELATIONSHIPS	1	2	3	4	5
A) Developing the Cardinal Concept of No.					
- comparison of groups: equal/unequal:	oxoxo	dxdxd	txtxt	txtxt	txtxt
- counting: sorting: matching:	oxoxo	dxdxd	dxdxd	txtxt	txtxt
- zero as a cardinal number:	oxoxo	dxdxd	dxdxd	txtxt	txtxt
- numerations: place value: expanded-notation:	oxoxo	oxoxo	oxoxo	dxdxd	dxdxd
- regrouping:	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- factors; primes, & composites:	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- Roman numerals	oxoxo	dxdxd	dxdxd	txtxt	oxoxo
B) Developing the Ordinal Concept of No.	oxoxo	dxdxd	dxdxd	txtxt	txtxt
C) Equations as Symbolic Representations.					
- with place-holders:	oxoxo	dxdxd	dxdxd	dxdxd	txtxt
- with missing operational signs:		oxoxo	dxdxd	dxdxd	txtxt
- with more than one operation:		oxoxo	dxdxd	dxdxd	dxdxd
D) Developing Fractional Number Concepts:					
- part or parts of a whole:	oxoxo	dxdxd	dxdxd	dxdxd	txtxt
- part or parts of a group:	oxoxo	dxdxd	dxdxd	dxdxd	txtxt
-Decimal notation:		oxoxo	dxdxd	dxdxd	dxdxd
E) Developing the Concept of Addition - as a Binary Operation: Commutative & Associative:					
- as computation with whole numbers:	oxoxo	dxdxd	dxdxd	dxdxd	txtxt
- as computation with fractional notation:	oxoxo	oxoxo	dxdxd	dxdxd	dxdxd
- as computation with fractional numbers-in decimal notation:	oxoox	oxoxo	dxdxd	dxdxd	dxdxd
F) Developing the Concept of Subtraction - as a Binary Operation: inverse addition					
- as computation with whole numbers:	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- as computation with fractional numbers: in common notation:	oxoxo	oxoxo	dxdxd	dxdxd	txtxt
- as computation with fractional numbers-in decimal notation:		oxoxo	dxdxd	dxdxd	dxdxd
G) Developing the Concept of Multiplication as a binary Operation: repeated addition: Commutative: Associative: Distributive:					
- as computation with whole numbers:		oxoxo	dxdxd	dxdxd	dxdxd
- as computation with fraction numbers - in common notation:		oxoxo	dxdxd	dxdxd	dxdxd
- as computation with fractional numbers in decimal notation:			oxoxo	dxdxd	dxdxd

NUMBER AND RELATIONSHIPS *(Cont'd)*	1	2	3	4	5
H) Developing the Concept of Division - as the Inverse of multiplication:					
- as computation with whole numbers:			oxoxo	dxdxd	dxdxd
- as computation with fraction numbers - in common notation:			oxoxo	oxoxo	dxdxd
- as computation with fractional numbers - in decimal notation:			oxoxo	oxoxo	dxdxd
I) Developing the Concept of Integers:					
- addition by vectors on a line, to introduce negatives:	oxo -	oxo-	oxox -	oxo -	oxo
J) Number Patterns:					
- exploring, using, constructing:	oxo	oxo	dxdxd	txtxt	txtxt
- seriation:	oxo	oxo	dxdxd	dxdx t	txt
K) Ratio:					
- rate:		oxo	xo dxdxd	dxdxd	dxdxd
L) Problem Solving:					
- Closed-assignments	xxxx	xxxx	xxxxxx	xxxxx	xxxxx
- Open-ended assignments:	xxxx	xxxx	xxxxxxx	xxxxx	xxxxx
M) Field-Work: Games: Puzzles:	xxxx	xxxx	xxxxxx	xxxxx	xxxxx
N) Possible Extensions: -					
- Statistics, and graphical representation.					
- The Slide-Rule					
- Averages, Mode, Median, Mean:					
- Probability:					
- Bases, logarithms:					
- The Story of Numbers;					
- Historical Development of Numbers:					
- Book-keeping:					
- Scale-Drawings:					
THE INTER-RELATIONSHIPS OF NUMBER THROUGHOUT ALL ASPECTS OF MATHEMATICS:					

"I UNDERSTAND, BUT I CAN'T"...

How do we start? What is the place of group-work? What about skills? How is group-work best organized? What do we do with an unstreamed class of mixed-ability? What about individual work?

BEGINNINGS.....Our first consideration must be the transition from a centrally-organized, authoritatian classroom structure - towards a de-centralized activity-approach to learning. Some teachers have found a natural aptitude for initiating exploratory work under difficult circumstances, others are disinclined to abandon formal class-teaching and a reliance upon a text book of sums. The following technique has been used by many teachers - in taking the initial steps towards the development of their personal approach and style - in guiding children in a flexible learning situation. Having made a small start, teachers have found that gradually they can involve all children, whether in groups or individually, in directed experimental work. We realize that no two situations are alike, and that all in a constant state of flux; however, we offer the following for your serious consideration.

B. Leading Question Technique (1)

(a) This technique permits progress towards the introduction of enquiry, whilst maintaining a conventional classroom organization: though a more informal seating arrangement for discussion is recommended.

(b) It allows the teacher to act as a 'chairman' in a debate: i.e. directing the discussion, whilst fully utilizing basic chairmanship techniques of not entering the discussion at certain points, and of introducing other aspects of the same question, as appropriate.

(c) Such sessions can be kept sufficiently open-ended to allow: - the teacher time to consider the implications of the discussion, and to think through the implementation of other ideas: - without creating a state of tension:

the children to have the opportunity to consider, to discuss, and to exchange their mathematical ideas:

both children and teacher time to reconsider their respective roles, and to allow for adaptation to their redefined responsibilities.

(d) Satisfying and curiosity-triggering discussions may lead to the need for using group-techniques; though in the early stages of developing L.Q.T., it may be that only a small, volunteer group of children will be anxious to undertake any practical exploration or experiments: however, as mutual trust and confidence are developed, more children will become involved in activity-based learning situations.

(e) The presentation of problems: these should be presented so that they stimulate the child's curiosity, interest, and imagination; in turn transforming them into his own problems. This technique requires deep sensitivity to the child/children involved, or a sound background in the development of children's thinking and interests, preferably both.

(f) The psychology and learning theories which are particularly relevant, are those which have their roots in the classroom, are appropriate, and which can be tried and tested there too.

(g) The intrinsic motivation which will be stimulated, and which will develop into an appreciation of mathematics, should not be squashed by the introduction of artificial forms of motivation, i.e. stars, marks, honour lists, and the like.

**** It is not suggested that all of the foregoing or following notes constitutes a miracle recipe to "instant, insightful" mathematics learning; however, it is suggested that if this and other techniques are not considered and developed, not much mathematical learning is taking place.

**** Please refer to Nuffield Guides: -
"Beginnings"; and "I Do, and I Understand".

B. Grouping Techniques

Teachers will need to experiment and find their own ways to solve the question of grouping, and should not hesitate to try a number of flexible approaches: again, as situations vary so enormously, it would be foolishness on our part to suggest irrelevant procedures, but we offer the following for your consideration.

1. CLASS PROCEDURES:

(a). Imposed Grouping: this can be organized by the teacher on the basis of his/her knowledge of the children's capabilities and personalities: especially with reference to the particular context under investigation /discussion, etc.

(b). Voluntary Grouping: in which the children organize themselves into groups of a pre-determined size, structure, - as appropriate.

(c). Compromise Grouping: in which the advantages and disadvantages of both (a) and (b) are compromised into a feasible, flexible working arrangement.

2. GROUP OPERATION:

(a) A group leader should be selected: i.e. one who is responsible for the conduct and operation of the group.

(b) A 'properties manager' should be selected: i.e. one who is responsible for the care, maintenance, and return of all the apparatus/instruments etc. which may be used by the group.

(c) Initially, leading questions should be developed from past interest, work, etc. or a current topic: which will provide both teacher and children a common base from which to work into lively discussions.

(d) Eventually, a leading question might be "How might we set about finding the height of the school?"...which could well result in four or five groups of children each undertaking some aspect of solving this problem. This activity may be staggered over a period of time, each group participating either simultaneously or at different times; it may overlap into other areas of the curriculum, e.g. written reports, model-making, spoken commentaries onto tape, etc. It may be that this becomes a highly concentrated project, in which all of the class are involved, simultaneously, over a shorter period of time, and which will utilize all of the available resources, - whilst completely absorbing all other aspects of the curriculum.

(e) Developments from the L.Q. suggested in (e), might spark physical exploration, experiments, etc. and the discoveries and questions which will arise from these activities will lead to an open-situation in which both children and teacher will be able to exchange ideas and discuss possibilities, in a practical, natural way, both working together to solve a problem. These developments provide the opportunity for the teacher to introduce various instruments (e.g. clinometers, shadow-sticks,), and techniques of triangulation, simple surveying, etc.

(f) During the transition period to the early stages of activity-based learning, - working in a group provides the child with greater support, security, and confidence: responsibility for his own work should be encouraged and developmental opportunity provided over a long period of time; however, it must be recognized that this will be limited to each individual child's capacities.

C. Leading Question Technique (2)

(a) A generally relaxed atmosphere and a healthy rapport must be established in the classroom situation, prior to the introduction of L.Q.T., for these conditions are essential to the climate in which free discussion can take place.

(b) The teacher sincerely assumes the role of guide, and as the L.Q.T. develops, this role evolves into that of a wise, guiding chairman; eventually, in the decentralized learning situation, these roles will merge into yet another role.

(c) Ideas, clues, inspirations, tentative suggestions, - which come from the children, must be followed through to a satisfying conclusion, regardless of the fact that the guide may foresee an eventual impasse of some kind.

(d) Questions which are asked by the children should be transformed into other questions, - questions which they can solve unaided; and which in turn, help with the answering of or the requestioning of the original question. This tactful procedure encourages confidence, and encourages independent thinking.

(e) A 'secretary' should be selected: i.e. one who is responsible for recording in an appropriate manner, a 'log' of the group's activities: i.e. taped, written, photographed, diagrammed, illustrated, etc.

(f) Any other responsibilities may be designated, as appropriate to the activity.

(g) Care must be taken to ensure that the complete group knows what it is involved with: e.g. a specific experiment: through prior discussion, films, field trips, etc. There must also be an adequate opportunity for each child to play a significant role, to make his/her contribution to the activity: i.e. a feeling of worth.

(h) Before the group begins to become involved in any activity, limits re time, location, equipment, etc. should be established: - through group, inter-group, and class discussion. These limits should be clear and brief; later they should be recorded, and displayed in a place of easy access for general reference: they should also be included in the group's log.

(i) Periodically, a group may with (or might at the teachers discretion), to present a summary of its findings to date, its research, etc. - for discussion, suggestions and feedback.

(j) In situations where the children's activities may centre around, or information be needed from various community agencies; these agencies should be contacted by the teacher, prior to the activity commencing, with explanations re. purposes, etc.: after such excursions, the group must accept the responsibility for sending 'thank you' letters, or whatever is appropriate; copies etc. which will be recorded in their activity log.

(k) On completion of a project, or a specific phase of its activities, etc., the group should will need time to correlate and prepare their material, before making a presentation to the class. This will include all recordings, findings, demonstrations of experiments, etc.; displays should be set up by the children, for their presentation, and later for general class reference.

(l) The questions which will be asked by children in other groups will be especially significant, and could indicate some possible developments of present activities.

(m) Discussions of the inter-relationships of the findings, work, etc. between groups, should be carefully guided and chaired by the teacher. It is vital that each group knows what is developing in other groups, and that opportunity for some inter-change takes place: during activity operations, the teacher may indicate where groups could usefully effect an inter-change, when and as the occasion arises.

(n) Tapes, booklets, maps, etc., which may be produced by the groups through their activities, should be classified and be used as general class reference materials. At some point, these may become part of the school/community resource centre.

Classroom Organization

(a) Each group should establish its own 'centre' of operations, for conducting its activities: i.e. adequate table surfaces, benches, easels, section of chalkboard, etc. as may be appropriate.

(b) A central location should be established for all consumable materials which might be needed: e.g. paint, clay, inks, string, varnish, plastic, chalks, fabrics, wood, etc. This centre should be operated by the teacher, and should provide for the introduction of unfamiliar materials, the further exploration of familiar materials, and the presentation of materials which may be really significant re. the development of a particular activity.

(c) A central location should also be established for equipment: i.e. tape-recorder, camera, viewer, general reference library, etc. together with basic mathematics equipment: it may be necessary to establish two areas, depending on available equipment and uses. Organization and co-operation re. the useage of these things will be essential.

(d) Re. small instruments: i.e. stop-watches, compasses, map measures, thermometers, etc.: these items are very attractive to children - such items should be made freely available to the groups, but should be returned to the teacher for safekeeping. Care should be taken to establish reasonable procedures for use and return: the loss of these, and the subsequent disturbance could completely disrupt the group-techniques and the informal climate which is being developed.

Closed Assignments

Closed assignments begin from a fixed point in the child's experience, direct his activities into specific channels, and require - on completion, certain specific answers or date, to which both the child and teacher can assess as correct/incorrect; relevant/irrelevant; i.e. activity cards, exercises, etc. Most teachers are familiar with closed assignments involving practical measurement, and this type of approach may be extended into a wide variety of mathematical situations.

The limiting factors for closed assignments are the need to know the abilities of each child, of each group of children; the need to direct experience into situations which are significant and worthwhile in mathematics; and the necessity of having a wide variety of apparatus, and activities readily available.

It should be emphasized that the assignments are only a means to an end.

Open-Ended Assignments

Open-ended assignments initiate activity without giving specific instructions as to the channels to be explored, or the methods to be used. The true open-ended assignment directs exploration in so far as it initiates the activity, the rest is "up to the child"; for this reason, in elementary mathematics, it is advisable to base open-ended questions on interesting, evocative situations, at a variety of levels, which are rich in mathematical experience. The advantage of open-ended activities is that it stimulates thought, and active participation - at the level at which the child is capable fo working; and leads to purposeful exploration for the child; obviously, it provides the teacher with considerable insight into the abilities of, and understanding of the child.

e.g.

"Find out what is mathematically interesting about this old typewriter". may lead the child/group of children to letter frequency counts, circumference of rollers, timing the number of strokes per second, measuring letters and lines, studying levers, springs, ratchets and pauls, comparison of sizes and lengths of lines with other styles of characters; it may be that the child will only weigh and measure it, count the keys, and see the numerals; another child may only see it as a recording device; some child may see possibilities of punching out seriation patterns...etc... and of course, some child may find no mathematical significance in the typewriter.

e.g. "Without counting all the peas in this tin, find out how many peas there is in one pound; how much does one pea weigh?" Soak the peas in water for 24 hours, then discover all you can about their wet weight and size. Write an account of your findings and observations.

e.g. "Make this piece of clay into as many different shapes as you can. Record each shape, in a square, on the squared paper".

e.g. "Here are three cog wheels of different sizes. Find out all you can about - how they turn when they are put together. What could they be used for?"

Games and Puzzles

Games: - "They are goal-seeking activities with rules. For this reason, games are natural models for all purposeful activities, in which we can study with greater clarity the strategy for reaching our aims in the competition of life". - Professor Bronowski. Children first enjoy games at a pre-scientific level, a magical level: the element of chance in 'Snakes and Ladders' excites them, they understand the code of the game but are unable to control the variable of the dice. The more conscious they are of the element of chance, and how it operates, after continuous playing (or working out the perfect number for each throw) the less likely they are to regard it at the level of 'luck'. In games where chance does not operate, e.g. Draughts, they can enjoy playing the game, but only when they have recognized the need to block their opponent from taking their pieces, and have begun to discover 'moves' can they begin to apply strategy and operate within the logic system.

If we follow and observe the steps by which a child learns to play a game, we can gain an insight into the process by which he learns, thinks, and behaves. From the stages of familiarization with the system and improvisation, e.g. 'playing' with the pieces, inventing rules: the need to know the rules emerges. In most games, the introduction of the system takes place gradually, a child finds it difficult to operate a full system in the initial stages: however, once the child has mastered the system, he will likely insist on it, and the system is 'closed': (note: deliberate breaking of rules, and the injecting of a new logic into a game, may indicate - a 'creative' child: the way and reasoning used by the child in creating changes often indicated the type of 'thought pattern' used by the child: or a development of thinking.) After this follows a period of 'hazard' play in which it is a matter of chance who wins; gradually experience within the system teaches cause and effect; i.e. the logic is learned, and behaviour conditioned; then applied strategy and intensive practice, until a plateau is reached, or the possibilities have been exhausted: (note: - if the game has potential and many variables, the child will return to it, re-learn it, and discover new possibilities.)

The closed logic systems of games reflect only certain aspects of thinking, learning, and operating: it is their limitations which make them suitable models for purposeful activities in which variables can be discovered, and logic determined. We all find games, puzzles, coded, and riddles useful, amusing, and significant throughout our lives: the tremendous fascination of these for children, is derived from the child's need to operate within a simplified model of reality: the child gains enormous satisfactionaand security from operating a system efficiently to achieve a goal successfully.

In all games where chance does not operate, e.g. chess: we can relate all the variables to a perfect information system, and so discover the most efficient way to achieve our goal: where chance operated the variables are never infinite, and the laws of probability limit them - thus we may never evolve an economically viable system to win: but we can calculate all manner of probabilities; e.g. that a man named Harry, living in a hamlet, will lose his hound-dogs, on Halloween...; This type of mathematics is frequently applied by insurance companies to all manner of liabilities, risks, etc.: it is also used in all types of highly sophisticated 'war-games' and 'social economic-engineering games'.

EXAMPLES AND REFERENCES FOR GAMES AND PUZZLES: -

(a)	Snakes and Ladders	Counting on/backwards.
(b)	Dominoes	Number patterns.
(c)	Card games	Quick counting; sequences
(d)	Dice-Throwing	Laws of Chance: variable 6, 12, 18.
(e)	Monopoly	Laws of Chance and Probability.

(f)	Draughts	Study of openings, and counters.
(g)	Chess	End games, limited men, analysis of moves for each piece, the full game, opening gambits, etc.
(h)	Puzzles	Magic Squares, Tower of Hanoi, Sliding numbers, Paradoxes, Hex, Polyominoes, Flexagrams, Moibus Rings, Bridges of Konisberg, Problems, Card tricks, Number Tricks, Etc..... These and many others can be found in the following reference books: -

““"Mathematical Puzzles and Diversions"
Martin Gardener, (Pelican)
"More Mathematical Puzzles and Diversions"
Martin Gardener, (Pelican)
"A Puzzle Mine": Dudeney: (Nelson)
"Mathematical Recreations"
M. Kraitchick: (Allen & Unwin)
"Mathematical Games & Pastimes".
A.D. Domolyad.(Pergammon Press)
"Readers Digest Books' of Teasers and Twisters.
Scientific American" - useful source of puzzles.

(I) Many of the newer games being manufactured; i.e. Parker Bros.: Mattel; etc. are suitable for extending the breadth of the child's mathematical thinking, logic and language.

Number Patterns

Pattern, whether it is natural or manufactured, establishes relationships between the elements' which comprise the pattern: by creating and exploring patterns, we are able to establish the way in which they are organized, and so gain further insights and understanding our universe. In attempting to organize and express themselves, in relating of the world in which they live, children adopt, adapt, and use patterns continuously: e.g.: - rhymes, chanting, jingles, skipping, clapping, playing games, establishing movement patterns, by the repetition of colour and shapes, by demanding stories with a repetitive theme, musical choruses; etc....

The pursuit of pattern is not a thing in itself; it is derived from an awareness of, from experience in, and familiarity with a common situation. Many children are able to appreciate number patterns when they are presented in the context of an established, significant relationship: e.g. the patterning of houses - rows, curves, random; mountains valleys, trails; trees-branches, twigs-leaves, building patterns churches-spires/domes/towers etc...

Organized Activities for Exploring patterns: -

(a) Arranging objects, groups of objects, (odd/even nos.)

(increasing/decreasing patterns): (seriation): exploring alternate patterns of given group of objects: increasing/decreasing by size and number: etc.

(b) Arranging squares of cardboard, wood, etc. so that each square is larger than the previous one. How many squares in each pattern? How many more in each one: Cf. cubes.

(c) Arranging triangles in patterns using right-angled and isosceles triangles: Cf. scalene tiling. Extending this into patterns using the various n-gons and trapezoidal shapes

(d) Arranging free-shapes into repeating or all-ever patterns: relationship to symmetry: extend into arts and crafts.

(e) Arranging free-shapes in
shape: alternating with arrangement of regular shapes within a free-form: this should lead to questions of balance and form.

(f) Pattern in natural environs: feathers, leaves, rocks, pebbles, markings, cliffs, animal markings.

(g) Pattern in movement: natural movement and the movement of aeroplanes, cars, skiddoos, sleds, etc.

(h) Pattern in manufactured articles: functions, etc.

(i) Pattern in speech, prose, poetry: recording of these patterns: relationship of pattern and speed. Tones. Use recordings by Alec Guiness, Richard Burton, Wolfit, Dylan Thomas, etc.

(j) Pattern in music: recording of patterns: tempo: reading of musical patterns/writing of these: discovering polyrhythms: stress, and shape of patterns: effects of various rhythms on people: Use the Mary Helen Richards Music Program for young Children.

(k) The Hundred Square, the Multiplication Square: the Addition Square:

(l) Perspective: optical illusions.

REFERENCE BOOKS

Nuffield Mathematics Teaching Project

Guides from: S.R.A./G.C.M.P.; Addison Wesley; Project Mathematics; New Dimensions; Cuisenaire-Gattegno; etc.

Provincial Curriculum Guides

"Today's Mathematics" - Heddons - (Nelson)

"Primary Mathematics" - Dienes - (Macmillan)

"Young Children Living & Learning" - Hollomby - (Longmans)

' Children Discover Arithmetic' - Stern - (Harper & Row)

"Thinking in Numbers" - Diack - (P. Skinner)

"Mathematics and Western Culture" - Kline - (Allen & Unwin)

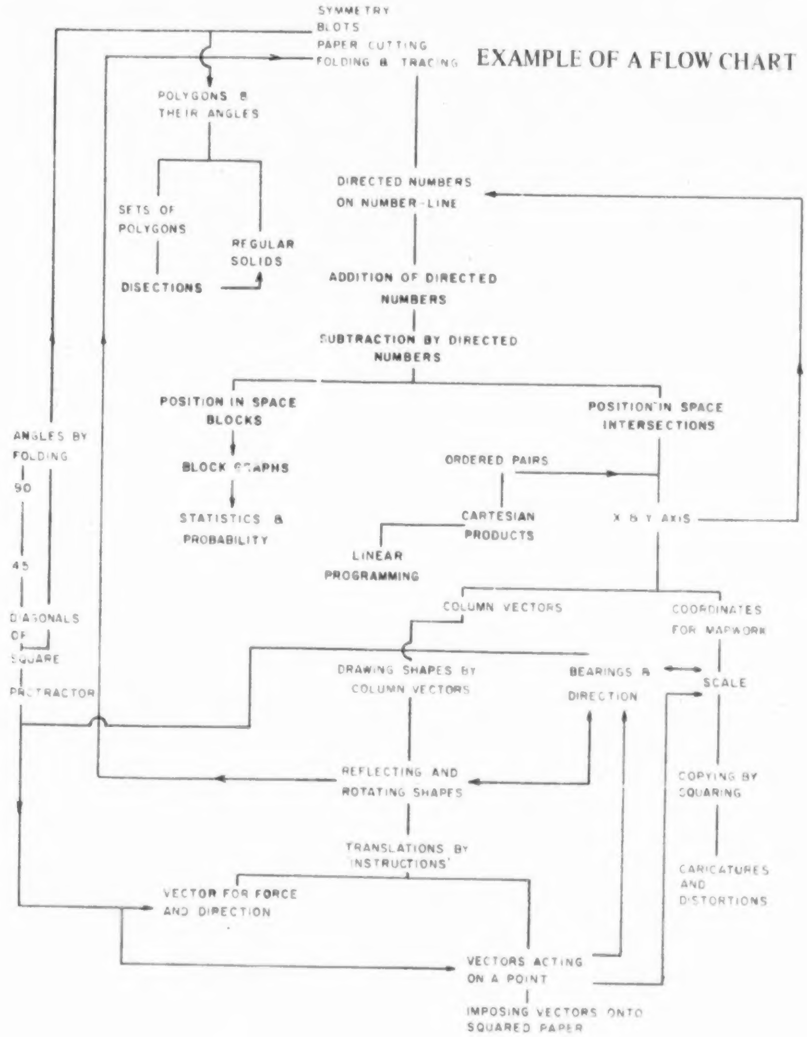
"Mathematics in the Making" - Hogben - (Garden City Books; N.Y.)

"Discovering Meanings in Elementary School Mathematics" - Grossnickle & Bureckner" - (Holt, Rinehart & Winston)

"The Franklin Mathematics Series" - (McGraw-Hill Ryerson)

"Freedom to Learn" - Biggs & MacLean. (Addison-Wesley)

EXAMPLE OF A FLOW CHART


SYMMETRY
BLOTS
PAPER CUTTING
FOLDING & TRACING
POLYGONS & THEIR ANGLES
SETS OF POLYGONS
REGULAR SOLIDS
DISECTIONS
DIRECTED NUMBERS ON NUMBER-LINE
ADDITION OF DIRECTED NUMBERS
SUBTRACTION BY DIRECTED NUMBERS
POSITION IN SPACE BLOCKS
POSITION IN SPACE INTERSECTIONS
ANGLES BY FOLDING
90
45
DIAGONALS OF SQUARE
PROTRACTOR
BLOCK GRAPHS
STATISTICS & PROBABILITY
ORDERED PAIRS
CARTESIAN PRODUCTS
X & Y AXIS
LINEAR PROGRAMMING
COLUMN VECTORS
COORDINATES FOR MAPWORK
DRAWING SHAPES BY COLUMN VECTORS
BEARINGS & DIRECTION
SCALE
REFLECTING AND ROTATING SHAPES
COPYING BY SQUARING
TRANSLATIONS BY INSTRUCTIONS'
CARICATURES AND DISTORTIONS
VECTOR FOR FORCE AND DIRECTION
VECTORS ACTING ON A POINT
IMPOSING VECTORS ONTO SQUARED PAPER

SUGGESTED OUTLINE

OF

ASSORTED BASIC EQUIPMENT

FOR

ELEMENTARY SCHOOL MATHEMATICS

A)

Abacus, assorted.
Activity Cards; Manufactured, self-made.
Adding Machine.
Adhesives.
Analysis of foot - rule.
Analysis of yard - rule.
Analysis of metric measures.
Area boards, assorted.
Ascoblocs.
Ascobrics.
Aviator's watch.

B)

Balance-lever.
Balance scales.
Balls, assorted.
Barometer.
Beads, assorted - size, shape, colour, material.
Bead-wires/laces.
Bead-frames.
Bills, currency (various).
Binoculars.
Blocks, assorted - table, floor, building, interlocking, wooden, rubber, plastic.
Blue-prints.
Bottles, plastic.
Bottle-caps, metal.
Boxes, assorted sizes - transparent & opaque.
Buckets, plastic, assorted sizes.

C)

Calculators, simple.
Calendars, asstd. types.
Callipers.
Cans - soup, juice, etc.
Candles,

Card holder.
Cards, playing/standard.
Card Games, assorted.
Cartons, plastic.
Cash-register.
Catalogues.
Cellograph & symbols.
Chart-stand.

(C) Cont'd.
Charts.
Clay, modelling.
Clinometer.
Clocks - demonstration model, constructional, asst'd. defunct clocks, clock-stamps, alarm, electric, etc.
Coherograph & symbols.
Coins, standard, ancient.
Colour-Math. Apparatus.
Collander.
Collections - Asst'd. objects, Asst'd. materials.
Compass, land.
Compasses, pairs - demonstration, pairs - individual.
Constructional Apparatus.
Cooking-timer.
Co-ordination Boards.
Corks.
Counters, assorted.
Counting-frames.
Crayons, asst'd.
Cribbage Board.
Cubes, coloured, approx. 5,000, 1" cubes, 3 cms. cubes.
Cubic foot in volume.
Cuisenaire Rods - demonstration set, individual sets.
Cylinders, sets, assorted.

D)

Date Stamp.
Dart Board.
Decimal place-holder.
Decimal Boards.
Dice, assorted - table & floor size.
Dienes Math. Apparatus.
Dienes Blocks.
Dominoes, pictorial, standard, table & floor size.

E)

Easel, presentation.
Egg cartons.

Egg timer.
Elastic bands, assorted.

(E) Cont'd.

Empric Counter Balance.
Equalizer.
Environmental materials.
Environment - local statistics,
economics, maps,
studies, reports, etc.
Experience Chart Pads.

(F)

Fabrics, asst'd.
Felt, asst'd.
Felt Pens - thick/thin, asst'd. colours.
Files - folder type.
Files - loose-leaf.
Filing Cabinet.
Films, 8 mm, 16 mm.
Filmstrips.
Fraction Boards, asst'd.
Fraction Wheels, asst'd.
Forms - ordering.
Funnels, asst'd. sizes, plastic/metal.

(G)

Games: Bingo, Chess, Draughts, Hex,
Ludo, Mah Jong, Monopoly,
Oscillator, Quoits, Skittles,
Snakes & Ladders, Spillikins,
Tic-Tac-Toe, etc.
Geo-boards.
Geo-magnetic symbols.
Geo-plans.
Geometric figures, asstd. (2D)
Geometric solids, asst'd. (3D)
Globes.
Gradient finder.
Graph Board, chalk.
Graph Chart, cloth.
Graph Paper, asst'd.

(H)

Hachette Precalculation Materials.
Height measure, wall.
Hour Glass.
Hundred Boards, asst'd.
Hygrometer.
Hypsometer.

(I)

Indian Beads.

(I) Cont'd.

Indian Ink.
Inflatables, dice, shapes, dolls.
Istrex calculating materials.

(J)

Jars, asst'd.
Jelly moulds, asst'd.
Jigsaw puzzles, asst'd.

(K)

Kaleidoscopes.
Kinder-city.
Kites, asst'd., constructional.
Knitting patterns.
Knitting materials & tools.

(L)

Labels, asst'd.
Land compass.
Land chain.
Land: rights, titles, etc.
Lego Sets.
Light Meters.
Liquid Measures, standard.
Liquid Measures, metric.
Living Index - cost of.
Locks, combination, etc.
Locomotion models: cars, engines,
aeroplanes, etc. games.
Logarithm tables.
Log Books (Observation Recording).
Logic Blocks.
Lotto, games.

(M)

Magna Board.
Magnetic symbols.
Magnetic tape.
Magnets, asst'd.
Magazines, asst'd.
Magazine rack.
Magnifying Glass.
Maps, assorted - Local Survey.
Map measurer.
Mapping pens.
Map rail.
Marbles, asst'd.
Mariner's compass.

(M) Cont'd.

Measuring cups, asst'd.
Measuring spoons, asst'd.
Metric measures.
Metronome.
Micrometer.
Miniatures: trucks, cars, dolls, animals, planes, etc.
Mirrors, unbreakable, magnifying.
Model-making materials: balsa wood, marquetry kits, etc.
Montessori Apparatus.
Mosaics, asst'd., floor & table.
Musical instruments.
Muffin tins.

(N)

Nails, asst'd.
Nail Board, circular.
Nail Board, square.
Nail Frames.
Nail Puzzles.
Number lines, various
Number poles.
Numerals: pictorial, jig-saw, peg, wooden templates.
Numberal-number: sorting, matching.

(P)

Paint, asst'd.
Paint Brushes, asst'd.
Paint Rollers & trays, asst'd.
Paper: Carbon, Cartridge, Construction, Corrugated, Duplicating, Freize-roll, Graph, Manilla tag, Metallic Railboard, Stencils, Sugar, Tracing, Tissue, etc.
Paper bags.
Paper patterns.
Paper plates.
Pattern Boards, asst'd.
Pedometer.
Pegboards, 25, 100.
Pegs, asst'd.
Peg-games, (e.g. Merripegs).
Pencils, asst'd., B to 4H.
Pendulum.
Pens, asst'd.
Perimeter Boards.

(P) Cont'd.

Periscopes.
Personal scales.
Picture files.
Pins.
Place-value Boards.
Plasticene.
Plastic-sheeting.
Plastic tubing.
Play-store: cartons, boxes, cans, packets, etc.
Plumb line.
Polaroid Camera & Film.
Poleidoblocs. Set G.
Poleidoblocs. Set A.
Popsicle sticks.
Posters.
Projectors, screens.
Protractors, demonstration, individual.
Pulleys, wheels, weights.
Pyramids, stacking, cuboid.

(R)

Rain Gauge.
Ready-reckoners.
Reference Charts.
Reference Library.
Roman Numerals.
Ropes, asst'd.
Roulette wheel.
Roulette chips.
Rubber stamps, asst'd.
Rulers, asst'd.

(S)

Sand, and container.
Scales and weights.
Scissors, left & right handed.
Set squares - 30°, 60°.
Set squares - 45°.
Shapes, asst'd.
Sieve.
Slides.
Slide rules, simple.
Sorting trays.
Spirit level.
Spirograph Kit.
Spools, asst'd.

(S) Cont'd.

Spring balance.
Stacking apparatus, asst'd.
Stern Structural Apparatus.
Stethoscope.
Stop-watch.
Straight-Edge.
Straws.
Survey tape, steel.
Surveyor's Sighting Pole.
Sundial.

(T)

Table, demonstration.
Table covers, asst'd.
Rape Recorder, Tapes, Headsets.
Tapemeasures, various.
Tangrams, asst'd.
Templates, asst'd.
Ten-Square Boards.
Telephone: field, battery, toy.
Telephone Directories.
Theodolit, simple.
Thermometers: Centigrade, Farenheit, Maximum & Minimum, Wet/Dry Bulb, Clinical Cooking, Earth thermometer, Immersion, etc.
Thread, various.
Thumbtacks.
Tickets, numbered.
Tiles, loose, asstd., floor, wall, ceiling.
Timetables: airline, bus, train.
Tinker Toy Kit.
Toothpicks.
Train and track, model.
Trundlewheels, 1' and 1 yd.
T-Square.
Typewriter - print sets.

(U)

Umbrella frame.
Unifix cubes.
Unifix Math. Apparatus.
Used, postage stamps.
Utensils, domestic.

(V)

Ventimeter.

(V) Cont'd.

Vocabulary Reference.
Volume Relations Sets.

(W)

Water Wagon.
Weather Vane.
Weaving Cards, loom.
Weights, sets, standard.
Weights, sets, standard.
Weights, sets, metric.
Wheels, various, cogwheels, etc.
Wool, asst'd.
Wrist Watch.

(Y)

Yard sticks, asst'd.

MUSIC

The Music Curriculum affords yet another means of communication which is so vital in the cross-cultural classroom. As is the case with specific subject areas such as art, drama, physical education, arts and crafts technologies, and, indeed, the entire spectrum of activity-centered learning experiences the child can be provided with the opportunity to express his ideas and his emotions through a non-verbal means. At the outset of the Northern child's formal education experience it is suggested that music can be used to broaden and deepen the communication processes as these are available to children whose first language is not English. As the child gains confidence in, and mastery of English as a second language increasing time and attention can be given to the verbal aspects (i.e. singing) of the music program. However, initially the concentration should be on developing listening skills, and on rhythm and motion as these latter aspects can be developed in terms of the child's need to express himself.

Akin to the need to emphasize the creative expression of the child through rhythm and motion is the need to relate the classroom curriculum to the traditional musical expressions and interpretations of the Northern cultures. The symbolic representation of one's heritage should not be replaced by a music program that gives exclusive treatment to "The Farmer in the Dell", or "Here We Go Round the Mulberry Bush", etc. Rather, there must be a place in any music program for the traditional expressions of the settlement peoples as well as the expressions of other cultures. It is becoming apparent that unless the school takes steps to recognize and to develop respect for traditional musical pursuits these cultural characteristics will be in danger of disappearance. In this respect, close consultation with the local people is necessary if this aspect of a child's education is to receive the attention it deserves.

If the music program is to reflect the aspirations and needs of the Northern peoples it will be necessary to build within the school curriculum periods of time wherein community resource people can demonstrate and provide instruction in the various aspects of their music. This is as it should be. Drum dancing, tea dancing, chanting, etc., can only be introduced and developed satisfactorily by those who have the prerequisite expertise - the people themselves. This may be too obvious to require any elaboration. Unfortunately, some teacher's manuals treat Indian music, for example, as if one classroom experience based on "Ten Little Indians" was the sum total of cross-cultural education in this particular area. Moreover, there has often been a lack of in-school time given to this type of cultural expression. In this manner the implication can be conveyed that drum dancing was fine as long as it did not interfere with the teaching of "Mary had a Little Lamb" or, on a more repulsive note, "Ole Black Joe". It is reasonable to suggest that a child can only be expected to appreciate his world and, in turn, the larger society of which he is a part, if he is given the opportunity to experience his cultural heritage on a plane comparable to that of the Euro-Canadian society.

In terms of selecting appropriate singing and listening materials the teacher should recognize the prejudice is not an unknown characteristic of many textbook series and recordings. Depending upon the cultural group in question, many major textbook series tend to portray non-white peoples in a negative light. Also it should be noted that the "virtues" of middle calss, Christian living often are emphasized to the fullest degree. The degree to which any school program should go in indoctrinating a "Work for the Night is Coming" and "This is My Father's World" type of philosophy is an open-question and should be regarded as such.

One further consideration regarding the music curriculum should be kept in mind. Music as fun and enjoyment is a prime consideration. In the outlined program following, the attention of the curriculum is on those aspects of music that bring enjoyment to the students. The concepts, as listed, are provided for guidance only, and are not to be construed as restrictive influences detracting from "music as something that is pleasurable to me".

CHILDREN AND MUSIC

What type of Program?	Sometimes the music curriculum is almost exclusively centered on a choral singing program. In terms of what is possible and practical such an approach is too restrictive. There are a multitude of avenues that can be explored. Here are a few.
Listening for a Purpose:	The variety of recorded materials that is readily available suggests several possibilities. Some examples are: discerning rhythmic patterns, cadence, tonal patterns; identifying instruments; learning different sounds from the words in a song; comprehending a story told in a folk song; differentiating between types of music, e.g. classical - popular - folk, etc. Recorded music used as a "background" while other times children may wish to "put on a tape or a record" for their own enjoyment. Make the necessary items available, including time, and see what happens.
Making Music:	A valuable booklet, Musical Instrument Recipe Book, McGraw-Hill Publishing Company, provides an assortment of "how to do it" ideas in terms of children making their own instruments from locally available materials. Rattles, drums, whistles, chimes, stringed instruments, etc. are included. Why not get the class involved in "making" their own settlement "orchestra"?
Music and Other Subjects:	Music need not be isolated to its own specific niche in the daily program. Music can be integrated with all subject areas. Some ways of doing this are: a folk song like "Squid Jiggin Ground" might be used to introduce a social studies unit on the people of Newfoundland; "The Alphabet Song" by Alan Mills fits into language arts; "This Old Man" may help to cover some problems of pronunciation, and so on. Although these things may be quite obvious, possibly

the use of music in mathematics and science is less so. In the former instance children may learn to "count" the beat, measure with a stop watch intervals between bars, explore relationships between mathematics and music in a more detailed sense. In science, learning about the volume of various containers can be related to the "sounds" that result when the containers are filled with water to various levels, or an activity might be developed around the "sounds" that are heard when various degrees of tension are applied to a string, a rubber band, a nylon cord, etc. Art Activities can evolve from listening to an instrumental selection and then interpreting what is heard through painting. Similarly, a ballad can be interpreted through pantomime. Try something like "John Henry's Hammer" which permits a lot of action. Folk dances can become integral parts of social studies and/or physical education. "Outdoor songs" can be related to a field trip, hike and the like.

Time for Music:

It is impractical to legislate precise time allotments for the music program on a daily or even a weekly basis. There are too many unknown factors. Some teachers may feel quite uncomfortable in a music context. Others feel less so. Music teachers specialists are few and far between. Some schools have little in the way of equipment and materials. Others are well stocked. The viewpoint of this curriculum is that music should always be incorporated into the regular weekly program beginning with the child's first year in school. Not only is music a major dimension of the aesthetic quality of life, but, as indicated in the foregoing music can be the key used to unlock the doors of learning in other subject fields as well. To put it in the vernacular, ' music can turn kids on", and in large measure this is the essence of education. By including music freely, and on a regular basis right at the outset of the school experience, over a span of years the individual can grow in his understanding of the role of music in his own life. In a real sense it will be the individual's attitudes toward music which will have lasting influence.

Child Involvement:

Aptitudes and interests with respect to the many dimensions of music are not uniform. Moreover, remarkably little in the way of research is available in terms of music in a cross cultural setting. The sensitive teacher will recognize the diversity, characteristic of the children. Some things to consider: rhythmic music has wide appeal among children - however, are there variations among/between Euro-Canadian, Athapaskan and Eskimo peoples? Contrastive Analysis information (see language arts section) provides concrete examples of the problems children face in acquiring English as a second language. How does this information relate to the music program, in particular the choral singing aspect? Can children learn difficult English sounds more easily through a jingle set to music? Are there some sounds which children do not readily hear through the spoken word but which they may hear more readily through music? How does the manner in which sounds are vocalized in Athapaskan and Eskimo music relate to the vocalized sounds expected in conventional classroom music? What variations exist in the range of musical sounds that can be heard by various cultural groups? Similar questions could be raised to the point where the most basic question of all comes to the fore: "Upon which strengths of the child can the music program be based?" Wrestling with this question may lead to the conclusion that for some children a singing program is not the best place to begin. As intensive listening program likely will be required followed by a variety of activities incorporating the innate rhythmic potential of children that eventually lead to instrumental work and choral singing. In this way a background of music experiences can be developed through listening; the child can become actively involved in making some local instruments, using music in other subject fields; and then he might be introduced to singing, keeping in mind that even if singing is not to his liking he can pursue his music interests in other directions. As the child grows older the importance of a diversified approach to music becomes even more pronounced. For example, with approaching adolescence the individual can become very self conscious, physically his body is changing. Mentally he may be unsure of himself. An exclusively singing oriented program can only compound his uncertainty. However, there is no reason why his growth in music appreciation need be impeded at this stage. His interests may be focused on a listening program or a local "pop" group type of music. The concern in this respect is for keeping the student "switched-on" rather than having him become frustrated and disenchanted with what a limited approach has to offer.

Local Involvement: The school program should welcome the opportunity to incorporate the music of the Athapaskan and

Eskimo peoples wherever and whenever this is possible. In attempting to do this the teacher should seek the advice of the School Advisory Committee. Is this something that the people would like to see done in their school. Possibly for religious or other reasons the parents would prefer that their music be excluded from the school program. This is a people decision. Assuming that there is a positive response to this idea the teacher may wish to consider approaches such as: the children listen to the drum dance (tea dance) and then this is followed by a description of the significance of the particular selection; the community people demonstrate the use of the drum - its composition, the rhythm of the beat, the dance steps; story telling and music are combined; if permission is granted, the children might tape some of the music for later classroom use; from a social studies angle, the music could be compared and contrasted with that of other Indian peoples in Canada (Sundance Owl dance, Chicken dance, etc); comparisons could be made with the music of cultures around the world; the presence/absence of costumes and regalia in dances could be explored; the concept of the "Pow Wow" as this is popular among native peoples of North America could be investigated; children could try their hand at constructing their own traditional music instruments. The possibilities are there.

The Last Word:

This curriculum makes no pretense of being the definitive approach. Neither, does the curriculum imply that this is the way to develop musicians. The aim is to make it possible for children to explore music in its many dimensions, extend their awareness of what music has to offer; refine their attitudes toward music; and have a lot of fun!

PROGRAM OUTLINE

Year One

Listening Skills

- Listening to sounds in his world - at home and at school.
- Listening to teacher's voice or recording of a song.
- Listening to short instrumental selections of many kinds.
- Listening for stories and moods in music.

Rhythm and Movement

- Feeling the underlying beat and accent in music.
- Learning many simple action songs and singing games.

- Experimenting with:
  - basic rhythms - walking, running, skipping, jumping, galloping, clapping;
  - creative rhythms - hammering, rowing, sawing, scrubbing;
  - interpretive rhythms - sailing like a feather, flying like a bird.
- Using body movements to indicate the most obvious changes in:
  - melodic pattern - up - down, high - low;
  - rhythmic pattern - even - uneven;
  - phrase structure - like - unlike;
  - mood;
  - dynamics - loud - soft.

Playing Instruments

- Developing feeling for underlying beat and accent in music.
- Developing ability to imitate rhythm patterns.
- Using simple rhythm (percussion) instruments.
- Experimenting with the sound of many different rhythm instruments.
- Choosing instruments appropriate to mood of music.

Concepts

- Beginning development of aural and visual recognition of basic elements in music: up - down, fast - slow, loud - soft, repetition - obvious changes.
- Developing feeling for underlying beat and accent.
- Developing feeling for basic rhythms that walk, run, skip.

Creative Activities

- Creating free rhythmic response to music.
- Taking part in singing conversations.
- Adding original words to familiar songs.
- Selecting appropriate instruments to accompany singing and dancing.

Singing (As appropriate to language development)

- Singing - group and individual, using a wide variety of suitable songs.
- Participating in tone calls and echo games to develop the singing voice.
- Using the voice to create music.
- Finding pleasure in participating with a group to produce a satisfying result.

Year Two

Listening Skills

- Listening to sounds in his world - at home and at school.
- Listening to teacher's voice or recording of a song.
- Listening to short instrumental selections of many kinds.
- Listening for stories and moods in music.
- Listening for even or uneven rhythm patterns.
- Listening for pitch contours - highest or lowest word (s) in a song.

Rhythm and Movement

- Feeling the underlying beat and accent in music.-

- Learning many simple action songs and singing games.
- Experimenting with:
  - basic rhythms - walking, marching, running, swinging, swaying.
  - creative rhythms - chopping, shovelling, ironing, stirring.
  - interpretive rhythms - running like a rabbit, opening like a flower, creeping like a fox.
- Using hand and body movement to indicate:
  - melodic pattern - up - down, high - low;
  - rhythmic pattern - fast - slow;
  - phrase structure - like - unlike;
  - mood - simple dramatization or pantomime;
  - dynamics - loud and soft.

Playing Instruments

- Developing feeling for underlying beat and accent in music.
- Developing ability to imitate rhythm patterns.
- Using simply rhythm (percussion) instruments and melody instruments.
- Choosing instruments appropriate to mood of music.
- Creating appropriate rhythm accompaniments on instruments.
- Using instruments for sound effects in songs, stories, poems, or dramatizations.
- Beginning keyboard experience (as available and appropriate).

Concepts

- Continuing development of aural and visual recognition of basic elements in music: up - down, fast - slow, loud - soft, accent - underlying beat.
- Continuing development of "feeling recognition" of music that walks, runs, skips.
- Taking part in choral speaking.

Singing (As appropriate to language development)

- Singing - group and individual, using a wide variety of suitable songs.
- Participating in tone calls and echo games to develop the singing voice.
- Using the voice in matching tones and singing "in tune".
- Finding enjoyment from participation in singing activities.

Creative Activities

- Creating expressive movement in response to music.
- Creating a tune: to sing a name, to tell the day, to answer a question, to converse.
- Adding original words to familiar songs.
- Creating rhythmic patterns to accompany a song or dance.
- Selecting appropriate instruments to accompany singing and dancing.

Year Three

Listening Skills

- Listening to sounds in his world - out on the land, in the bush, in the

settlement.
- Listening to singing and recording as simple songs.
- Listening to short instrumental selections of many kinds including those of famous composers.
- Recognizing some elements in music: repetitions, dynamics, moods, familiar instruments, melodic contours, rhythm patterns, simple chord changes.
- Listening for pitch relationships of two tones - close or wide.

Rhythm and Movement

- Feeling the underlying beat and accent in music.
- Learning singing games and simple dances.
- Experimenting with:
  - basic rhythms - walking, tapping, running, galloping, skipping;
  - creative rhythms - brushing, climbing, digging, cutting;
  - interpretive rhythms - falling like a snowflake, running like a river, sailing like a cloud.
- Using hand and body movements to indicate:
  - symbols of notation - walk (quarter), run (eighth), step pause (half note);
  - phrase structure - rise - fall, like - unlike;
  - mood changes - dramatization of songs and listening selections.

Playing Instruments

- Continuing to develop feeling for basic beat and accent.
- Using rhythm and melody instruments.
- Developing feeling for rise and fall of melody line.
- Creating tunes on melody instruments.
- Using rhythm instruments to accompany singing, dancing, and choral speaking.
- Playing short tonal patterns by ear for pictures, numbers, or straight line notation.
- Continuing keyboard experience.

Singing (As appropriate to language development)

- Singing - group and individual, using a wide variety of suitable songs, including rounds.
- Continuing to improve in ability to use the singing voice, becoming increasingly aware of "in tune" singing.
- Learning to sing expressively.
- Using music readiness material, e.g. music charts and material in song book books.
- Finding enjoyment in participating in a variety of singing activities.

Concepts

- Seeing how music looks that walks ♩♩♩♩ or runs ♪♪♪♪ or skips ♩♪♩♪ by means of chart or chalkboard notation without staff.
- Becoming aware of directions at the beginning of a song that suggest mood (quietly, gaily).

- Understanding dynamics - loud and soft.
- Observing tempo directions such as moderately, dreamily, gaily.
- Relating words of the song to the music on the staff.
- Observing chord symbols.
- Taking part in choral speaking.

Creative Activities

- Creating a tune: to answer a question, to complete a melody, to accompany a familiar rhyme, to converse.
- Adding original words to familiar songs.
- Creating simple instrumental melodies.
- Creating percussion accompaniments to songs, dances, stories, and pictures.
- Dramatizing a song.
- Creating a rhythm pattern to express a mood - sad, worried, gay, excited, happy.

Year Four

Listening Skills

- Listening for recognition of great variety of sounds in his world - at the "Bay", radio, community hall, airstrip.
- Listening to singing and recordings of songs - solo,voice, small ensembles.
- Listening to longer instrumental selections of different styles and moods including some of famous composers.
- Listening for continued recognition of elements in music - kinds of accompaniments.
- Listening to distinguish between major and minor tonalities and effects.

Rhythm and Movement

- Developing the feeling for beat and accent through:
    - changing body movements - strong beat (tap foot, clap hands, bend knees) and weak beat (clap hands, snap fingers, slap thighs);
    - recognizing metric grouping of beats - twos (strong, weak) and threes (strong, weak, weak);
    - recognizing time signatures - ♩ 2 and ♩ 3
- Learning singing games, action songs, and dances with more attention to rhythmic detail.
- Experimenting with basic rhythms - jumping, leaping, rolling, skipping, trotting.
- Developing creative and interpretive rhythms.
- Expressing through movement:
    - phrase structure.
    - relationship of muscle experiences and eye symbols of notation;
    - mood - changes in dynamics and tempo, dramatization of songs and listening selections.

Playing Instruments

- Using rhythm instruments as an aid to becoming aware of notation.
- Using melody instruments in recognizing and echoing melodic patterns.

- Creating tunes on melody instruments.
- Using chording instruments (autoharp).
- Creating rhythmic and melodic patterns to accompany singing, dancing, and choral speaking.
- Performing on instruments, including homemade, alone or in a group.
- Continuing experience on the piano keyboard, as available.

Singing

- Singing - group and individual, using a wide variety of suitable songs.
- Developing the ability to sing accurately within an expanding range.
- Learning to sing expressively and rhythmically.
- Developing pitch reading and rhythm reading.
- Introducing part singing by the use of simple descants and easy partner songs.

Concepts

- Understanding terms: staff, note, melody, rhythm, rest.
- Understanding that:
  - placement of notes on staff indicates melody or tune of song;
  - different kinds of notes indicate rhythm (whole, half, quarter, eighth);
  - rests indicate stopping places;
  - a phrase is a musical sentence.

Creative Activities

- Creating a tune with voice or instrument.
- Creating a rhythm to accompany a poem, song, dance, story, or picture.
- Creating instrumentation for a song.
- Making and playing their own instruments.
- Talking to each other by means of rhythm instruments (drum-talk).

Year Five

Listening Skills

- Listening to recordings of songs of increasing complexity - by solo voice, small ensembles, barbershop quartets.
- Recognizing the four families of instruments.
- Recognizing phrases, repetitions, and variations of melodies.
- Becoming aware of accompaniments and their contributions to mood and atmosphere of selections.
- Realizing that different types of music serve different purposes.
- Learning about people of the world through songs, dances, games, instruments.

Rhythm and Movement

- Learning singing games, Canadian and other folk dances, square dances.
- Learning more advanced basic rhythms and movements.
- Developing understanding of differences in feeling between commonly used metric groups - ♩2, ♩3, ♩4, ♪6.

- Developing creative and interpretive rhythms which lead to definite and more precisely timed response to music.
- Discovering relationship of rhythmic movement and dance patterns with musical form e.g. act out simple rounds.

Singing

- Singing - group and individual, using a wide variety of suitable songs.
- Singing well in unison with attention to diction, pitch, attack, release, tone quality, posture, breathing, phrasing, sustaining vowels, clear consonants.
- Continuing reading simple notation.
- Continuing part singing by the use of rounds, descants, partner songs, chants, echo songs.
- Learning to sing with a variety of accompaniments - recorder, bells, autoharp, piano, rhythm instruments, drums, as available.

Playing Instruments

- Relating rhythm patterns to instruments.
- Using melody, rhythm, and chording instruments to implement music reading.
- Developing feeling for harmony and rhythm.
- Adding rhythmic and melodic accompaniments to vocal and instrumental selections.
- Creating and playing original tunes and simple descants.
- Performing on instruments (including homemade), alone or in a group.
- Continuing experience on the piano keyboard.

Concepts

- Understanding terms: scale, sharp, flat, time signature, staff, clef, space, line.
- Understanding that:
  - a scale is composed of sounds arranged according to a definite pattern;
  - sharps and flats in the key signature determine the beginning tone of the scale or key in which a song is written;
  - the time signature indicates rhythm or meter of song;
  - a measure bar separates rhythm groups;
  - rests have definite duration just as notes do.
- Relating the pitch of the note to the printed note by singing and playing.
- Identifying like and unlike and similar phrases from notation.
- Reading simple autoharp parts.
- Understanding time signatures $\frac{2}{4}, \frac{3}{4}, \frac{4}{4}$

Creative Activity

- Creating tune and text and learning how to record it.
- Adding a simple descant to a tune for singing or playing.
- Adding rhythmic introduction.
- Adding rhythmic accompaniment to song or dance.

- Making up a rhythm pattern and recording it.
- Creating instrumentation for a song or recording.

Year Six

Listening Skills

- Listening to increasingly more complex songs, choral and instrumental compositions.
- Recognizing some members of the four families of instruments including fretted instruments.
- Listening for recognition of the way (s) in which the voice is combined with instruments and groups of instruments.
- Becoming aware of artistry in performance by small groups including their own.
- Listening to learn more about the world's peoples through their music.

Rhythm and Movement

- Learning more challenging singing games, folk dances, square dances, couple dances.
- Adding rhythm accompaniment to songs and dances.
- Increasing understanding of meter by learning basic conducting patterns in two, three, and four.
- Using more advanced rhythms in different combinations in creatingdances to accompany rhythmic selections.
- Dramatizing ballad-type songs and other forms of descriptive music.

Singing

- Singing - group and individual, using a wide variety of suitable unison and part songs.
- Continuing good singing, giving artistic interpretation to a song, singing with accurate pitch, increasing resonance, dynamic control.
- Increasing ability to read music by using a wider range of musical symbols and notation.
- Continuing use of rounds, descants, partnersongs, and chants.
- Developing ability to sing in two part harmony.

Playing Instruments

- Using melody, rhythm, and chording instruments, e.g. recorders, ukuleles, as another avenue of participation in music.
- Adding rhythm accompaniments to vocal and instrumental selections to develop music reading.
- Creating and playing original tunes, descants, and simple harmonies.
- Performing on instruments alone or in a group.
- Continuing experience on the piano keyboard.

Concepts

- Understanding terms: treble ,clef, step and skip interval, staff, lines, spaces.

- Learning names of lines and spaces on staff as needed.
- Becoming able to locate do ; feeling for key centre and tonic chord.
- Understanding rests: whole, half, quarter, eighth, and their value.
- Recognizing scale passages by sight and sound, using syllables, numbers or letters in reading simple pitch songs.
- Recognizing tonal sequences either up or down a step or two.
- Understanding use of: sharps (♯) in raising tone; flats (♭) in lowering tone; natural (♮) in raising or lowering tone; dynamic signs *p* and *f* .
- Developing an awareness of how symbols assist in determining the mood of music.
- Developing ability to read music pharse-wise rather than note-wise.
- Understanding time signatures: $\frac{2}{4}, \frac{3}{4}, \frac{4}{4}, \frac{6}{8}$ 𝄴 𝄵
- Reading simple instrumental scores.
- Exposing children to accompaniment scores, then playing simple instrumental scores.

Creative Activities

- Creating a tune for an original text and text for an original tune and recording it.
- Creating simple descants and second parts to familiar songs.
- Creating dance and rhythmic interpretation of instrumental selections.
- Creating rhythmic and melodic accompaniments for songs using instruments and voice.
- Creating incidental music to a play or pantomime.

Year Seven

Listening Skills

- Listening to increasingly more complex choral and instrumental selections for awareness of structure, mood, phrasing, texture, tonality.
- Recognizing all instruments in different types of groups.
- Becoming more aware of artistry in performance.
- Becoming acquainted with music from contemporary and romantic eras.
- Listening for recognition of the soprano, alto, tenor, and bass voices.

Rhythm and Movement

- Learning singing games, folk songs, square dances and period dances.
- Adding more complicated rhythm accompaniment (syncopation, dotted note rhythms, triplets) to songs and dances.
- Conducting singing, playing, or recorded music using standard conducting patterns.
- Using advanced rhythms in different combinations in creating dances to accompany rhythmic selections.
- Acting out more difficult rounds.
- Clapping and/or moving to one rhythmic pattern while classmates perform other rhythmic patterns.
- Increasing awareness of differences in the rhythmic structure and melodic form in dances of different periods.

Singing

- singing - group and individual, using a wide variety of note and reading songs.
- Continuing to refine singing by good diction, posture, phrasing, dynamic control, intonation.
- Singing increasingly independent second and third parts.
- Projecting mood through expressive singing.
- Using all types of classroom instruments to accompany singing.

Playing Instruments

- Using melody, rhythm, and chording instruments e.g. guitars, drums.
- Adding rhythmic and melodic accompaniments to vocal and instrumental selections.
- Developing feeling for harmony and rhythm.
- Creating tunes, descants, and harmonies to develop music reading.
- Developing a classroom orchestra.
- Developing an awareness of tonal colour through playing appropriate instruments.
- Continuing experience on the piano keyboard.

Concepts

- Understanding terms: D.C. al fine, fermata.
- Increasing ability to use and understand note values and rests to sixteenths.
- Understanding commonly used key signatures.
- Recognizing rhythm patterns, syncopation, repetitions.
- Gaining insight into form of song - melodic organization, as well as rhythmic organization into phrases.
- Reading songs in minor key.
- Recognizing intervals of a third, harmonizing by thirds and sixth.

Creative Activities

- Creating a more complex song and recording it.
- harmonizing by ear favourite songs.
- Making up introduction, simple accompaniment, coda, or percussion part for a song.
- Experimenting with chording using instruments or voices.
- Creating rhythm accompaniments to songs and dances using instruments, voices, and body movement.

RESOURCE MATERIALS

Curriculum Guide for Elementary Music

Alberta Department of Education, 1968. (Available from Curriculum Division, Yellowknife).

Sally Go Round the Sun

With accompanying recording. 300 songs, rhymes and games of Canadian children; E. Fowke, McClelland and Stewart, Toronto, 1969.

As good a collection in one volume as is currently available. Beautifully illustrated. N.B. Inclusion of "debatable" material however, such as "My father is a garbage man - Pheew".

Musical Instrument Recipe Book, McGraw-Hill Company, Toronto.

Education Through Music

The Richards Institute of Music Education and Research, 149 Corte Madera Road, Portola Valley, California, has developed an approach to music education which has considerable merit within the Northern cultural context. It is suggested that schools may wish to purchase one set of the various materials for study purposes leading to possible inclusion in their curriculum.

Recordings

The recorded material as listed in the Language Arts section of the handbook are equally appropriate for use in the music program. Also, refer to "Listening Materials" in the Yellow Pages.

OUTDOOR EDUCATION

Provided learning experiences in the "world" beyond the classroom environment is not in itself a new concept. Traditionally, field trips, class-outings and the like have characterized many school programs. What is significant is the considerable emphasis being placed on expanded outdoor education programs. The field-trips, the hike, the end-of-the-year picnic are being viewed as experiences with considerably more value than as "rewards" for good behaviour or as the prescribed "remedy" for restless teachers and students during the lengthening days of spring and early summer.

Underlining the widespread recognition being given to Outdoor Education are a number of educational-social concerns that, superficially appear to be quite diverse, but which in reality share common principles. Ecology is one such concern. It is too well known to require much elaboration that the environment shared by animate and inanimate objects is endangered by man's lack of understanding with respect to the conservation of natural resources, pollution and over population to mention but three aspects. It is apparent that the educational system must increase both the quality and quantity of attention heretofore applied to Ecology in all of its aspects.

The leisure-time society, in one variation or another, is a fact of life. In the recent past, Canada's unemployment rate has risen from 3% to 8-10% depending upon the season and the region. In the Northwest Territories the bulk of the Indian-Eskimo-Metis population are unemployed virtually on a continuous basis with the exception of those who are able to eke out a living on the basis of traditional pursuits, or who are fortunate enough to hold regular wage earning positions, if only on a seasonal basis. Moreover, for employed people, in general, the length of the work week is under review. Social trends indicate shorter working weeks with a corresponding increase in the amount of leisure time available. What the school is doing to meet the demands of leisure-recreation is a moot point. Like motherhood, most educators recognize the value of leisure-time education, but practical suggestions for developing programs in this field are relatively sparse. It is suggested that Outdoor Education is one readily accessible avenue worthy of our exploration.

The "living-laboratory' provided by the out-of-doors is one answer to the problem of the confined nature of conventional classroom experience. Furthermore, if we think in terms of language development alone, the environment provides a multiplicity of opportunities to develop the child's experiential background. Through directed exploration of the "world" in which he lives for, the child, whose first language is not English, outdoor experiences afford the opportunity to bring to life many concepts that are traditionally provided by artificial means alone - the printed page, the film strip, the 35 mm slide, etc. In a real sense outdoor adventure is yet another way of making, "Living and Learning" a reality and not just a catchy phrase.

A fourth concern enunciated by parents and educators alike is that the home and the school should work together toward the achievement of common goals.

Within the Northern context the chasm separating home and school can be unbridged in some instances. People may not be involved in the educational process to any substantial degree. Outdoor education can function as one "bridge" bringing people together. The planning of environmental experiences must be done with the consultation and active involvement of the people who know the local area best, the adults and parents of the settlement. In many communities the people may have real concern that their children are not learning survival skills, for example. Not only should the Outdoor program provide survival training but it should be taught by those who know the subject on a first-hand basis, the men of the settlement. On the other hand, "carrying coals to Newcastle" is to be avoided. The well-meaning teacher may plan a fishing expedition, a snowshoe trek, a canoe trip, within the isolation of his own experience and not take into consideration that some of these skills are best taught by those who depend upon them for their very existence. Consultation with parents is a practical necessity if this type of experience is to meet specific needs and if it is to have meaning for those involved. As an overriding consideration it should be noted that Outdoor Education affords an excellent informal meeting ground involving teachers-students-parents. It is an explicit way of taking education to the people. Unquestionably, communication and understanding can be enhanced by working and playing together in the natural surroundings of the settlement; within the physical dimension of the peoples' lives and livelihood. Learning about nature in nature, coupled with the utilization of the various senses, is infinitely superior to the sight-sound approach of formal classroom routine.

AIMS AND OBJECTIVES

1. To provide a practical means of making home-school involvement in education a reality.
2. To provide actual experiences leading to self inquiry and discovery in a variety of disciplines.
3. To provide real-life situations for problem solving and developing those skills necessary to adapt to changing life conditions as, for example, leisure time.
4. To provide a neglected dimension for the promotion and encouragement of independence, resourcefulness, flexibility, and creativity.
5. To provide for the opportunity to develop concepts leading to the wise use of natural resources.

THE PROGRAM

An Overview

Outdoor Education is an integral part of the usual subject disciplines that are made available to pupils as a matter of course. A variety of activities are suggested as these can be related to specific disciplines.

Art

- Recording of observations through sketching.
- Learning about Natural design through observation and drawing (painting) of rocks, leaves, grasses, shrubs, seeds, trees, clouds, pressure ridges, ice and snow formations, etc.

- Observing and sketching natural change - drifting snow, storm clouds, wind and water erosion.
- Relating colour to bright, sunny days; dull, overcast days; dark, stormy days.
- Illustrating signs for a nature walk or trail.
- Modelling, using local materials as available.
- Carving, using appropriate stone as available.
- Learning about, gathering, and preparing materials used traditionally as dyes.

Language Arts (relating each item to the English as a Second Language program)

- Listening and responding to the sounds of nature.
- Developing reading and vocabulary competencies through: acquiring words to describe sounds; organizing sensory impressions; expanding vocabulary based on observations; making a pictorial diary of on expedition; dramatizing actions observed in nature; interviewing community people; writing and telling tall tales based on experiences.
- Writing records and reports.
- Creative writing.
- Orally expressing one's adventures on various social situations.

Social Studies

- Field sketching.
- Sketch mapping.
- Historical field studies.

Mathematics

- Observing design (geometric) in nature.
- Plotting weather graphs.
- Determining age of trees by counting rings.
- Hiking with a compass.
- Making a scale map of a site.
- Operating a stop watch to measure speed of walking.
- Planning amounts and costs of food for a cookout.
- Pacing distances in hiking.
- Estimating distances between natural land formations.
- Staking out an acre of ground.
- Measuring the circumference and diameter of a tree.
- Estimating the board feet in a log.
- Estimating and measuring dimension of a building and reporting on percentage error.
- Estimating and measuring the height of objects through measurement of their shadows.
- Estimating and measuring the width of a river or lake.
- Laying out activity areas.

Physical Education

- Camping and survival skills.
- Outdoor living techniques.
- Casting and angling.

- Shooting and hunting.
- Boating and small craft.
- Water activities and safety.
- Hunter safety.
- Archery.
- Skiing, snowshoeing and related winter activities.
- Hiking.
- Trapping and snaring.

Industrial Arts

- Constructing feeding stations, shelters (lean-to, tent, snow house, windbreaks).
- Building an outdoor fireplace.
- Craft work (leather, wood, hides).
- Tanning of hides (relate to science).
- Rope and knot work.
- Lapidary.
- Photography.
- Snowmobile operation and maintenance.
- Snowshoe construction.

Science

- Conservation study.
- The flora and fauna.
- Weather.
- Ecology.

PLANNING IN DETAIL

The Specifics

Preplanning of the outdoor education program is a prerequisite. The teacher must give considerable forethought to such things as: the frequency of the outdoor experiences, the timing of the activities, seasonal variables, the extent of adult involvement, the numbers of pupils participating, the nature of the experience (s) the intended outcomes, and a host of related matters. Clearly, the outdoor program is intended to be more than a pleasant stroll through the settlement, or a spirited gambol over "hill and dale" though it may well incorporate these features. The outdoor learning experience can be thought of as an inter-disciplinary and interpersonal discovery of the environment and people. To help the teacher in making advance preparations the following check list may be of value.

Select your fieldwork area. Adequate reconnaissance and consultation are essential. Not only can accessible working ground be found and examined, but routes to the site and a provisional program can be worked out.

Care. All fieldwork can be potentially hazardous, and proper safety precautions are essential. Make sure that your "field party" is suitably clothed and equipped. It is vital to know not only the capabilities of those with you but also to be sure of your own competence should an emergency arise.

Concern for the rights of others. Game officials, trappers, hunters, and people who live "on the land" undoubtedly can offer good advice that will help to ensure the success of your program. Involve them in your planning. Moreover, there may be instances where their work and interests conflict with your initial intentions. Respect their wishes to the fullest degree.

Safety is critical. Be prepared for emergencies, especially when exploring areas far removed from the settlement. One's sense of direction can become easily distorted in many Northern locations. Furthermore weather conditions can change quickly. Sufficient clothing should be taken along with possible weather shifts in mind.

Ecological considerations. It is almost a cliché to say that the Northern environment is "fragile". However, it has to be stated that there is no excuse for an uncaring attitude toward the delicate balance of nature that exists in the North. For example, the needless cutting down of trees or the "leaving behind' of refuse is as unjustified in the so-called "empty expanses" of the N.W.T. as it is elsewhere. Choose and use your area carefully. Then leave the area as you found it.

Avoid disturbing plants and animals. Trees and some other growing things, such as moss cushions and lichens on rocks take many years to develop, yet they can be thoughtlessly defaced or destroyed in a moment. If your turn over logs or stones, especially in water, remember to turn them back again and replace them carefully, or the animal which lives underneath may die. Take special care where birds are nesting. A nest is more likely to be deserted or robbed by predators if it has been disturbed and exposed. Eggs may become cold or young birds die if you stay near the nest too long. Other people may also be studying the plants and animals; be considerate of their interests when carrying out your work.

Collecting specimens. Much fieldwork can be done without collecting specimens. Unnecessary collecting is wasteful and can rapidly lessen the interest of an area. Use sketching, drawing, photography instead. If collecting is essential make sure that you only take enough to satisfy your needs. Use proper containers and, if possible, return living material to the exact spot from which it was taken. Never put it in an inappropriate environment.

Rare Species. A rare species may become rarer yet if it is collected, even by mistake. Too often it can happen that rarities are collected for identification because they are unfamiliar. As a general rule do not collect any living thing which is the only one in the area.

Outdoor Learning Activities (Detailed)

Art Activities

The outdoors provides an abundance of colour and design. Creative talent is developed by experimentation with new materials and techniques. Some art and crafts activities are described below.

Art Records

Children should be encouraged to record their observations by sketching. This promotes careful observation and close attention to shape and relative size. This is a better medium than photography for some situations because it allows the artist to eliminate distracting detail and to emphasize the features to which he wishes to draw attention. He can also squeeze a wide panorama into a more confined area on his paper.

Demonstrating Different Approaches

A group of children can be asked to sketch or paint the same natural object. Comparison of the sketches will show a variety of artistic expression. Different viewpoints, varying powers of observation and assorted artistic skills can all be demonstrated this way.

Natural Design Elements

The design found in leaves, grasses, rocks, plants, seeds, flowers, berries, trees and clouds will serve for many decorative purposes. Border designs for notebooks, books covers, gift wrapping paper, fabrics and many other uses can be found in such sketches.

Showing Changes

Nature is in a constant state of change. This can be the theme for sketching the same subjects on a succession of occasions. Some suitable subjects are:

1. An eroding stream bank
2. an emerging and growing plant
3. a tree through the seasons
4. the clouds as a storm approaches

The finished sketches can provide material for a hand operated "movie machine" or for a decorative room panel.

Illustrating Weather Conditions

Children can illustrate moods in a sketch by identifying and using the colours which predominate on a sunny day, a snowy day, or a dull day. They can devise various means to show that the wind is blowing, such as bent-over objects, swirling lines, or objects blowing along the ground.

Seeds

Seeds play many roles, and they can provide sketches useful in constructing a diorama. Some seeds are hitchhikers, floaters, parachutists, jumpers, or food providers. Careful observation in the autumn will provide excellent materials.

Perspective

A small cardboard frame can be held up by a student to define an object for sketching. By advancing toward the object he will see it through the frame in a larger perspective and realize the effect of distance on what he draws.

Nature Trail Signs

A school nature trail requires signs, and these are more meaningful if illustrated. Student sketches can be used for this purpose.

Modelling

Many river banks provide excellent modelling clay. Look for a smooth blue clay which is free of stones and feels very slippery. The finished models can be painted when dry.

Art in Outdoor Education

If we believe that there is beauty in nature, it follows that the out-of-doors is conducive to worthwhile experiences in sketching, painting or sculpturing. Teachers of every age level can provide their students with such an experience. Probably the best way to begin an introduction to art out-of-doors is through the short period-long on site sketching assignment. This length of time can then be lengthened to multiple periods of half-day, but the subject can be chosen within walking distance.

Social Studies-Geography

Geography is a social science closely related to the physical and biological sciences, and the humanities. As individuals, geographers seek an understanding of place, or some aspect of it, in time and space.

Direct observation, and the recording of observation, is a tool employed by geographers to understand place. Facts accumulated in this way provide the basis for discovering relationships of phenomena in space. Direct observation is a tool that can be used by geography students at various levels of competence. The description and explanation of landscape, whether "rural" or "urban",can b e extraordinarily instructive and informative.

First hand studies of the real-life situation enable exploration and discovery to go hand-in-hand. Practical experience in directed field activities promote the learning of concepts of spatial distribution, the understanding of physical processes and an appreciation of the relationships between natural phenomena and those factors germane to the understanding that man and the environment are inextricably [illegible] woven.

Ideally [illegible] following sound pedagogical practice, practical field experience proceeds from the local and immediate environment to the more remote, and from experience of the familiar and concrete to the less well-known and abstract.

As with field studies in history, local geographical field studies can be, and often are, points of departure for broader studies. Ultimately, the environment may be appreciated as an interrelated whole. Well before this stage is reached, however, students will realize for themselves that the distinctions between subject areas are very artificial and that the problems of geography are often best attacked by an inter-disciplinary approach.

There are three techniques of field observation and recording which can be undertaken locally that might be considered here. They are: field sketching, sketch mapping and transect work. It has been said that the accessible local ground is a laboratory for teaching in which the art of seeing is cultivated to a high degree.

Field sketching

Field sketching cultivates keen and appreciative observation. When the field sketch is annotated it becomes a record of the place visited and seen. Discussions can ensue from this record and certain relevant conclusions drawn on the basis of the evidence shown in the sketch.

Depending upon the age and competence of the students involved, field sketching can be simple or complex. Due to the time required to draw the landscape in this way, and the amount of practice required, it is reasonable to suggest that on a field trip with younger students the field sketch might be the only activity of the day. With more able and experienced students several field sketches can be anticipated, particularly if a transect is made through an area and graphic illustration is required to support notes made in the field.

The field sketch is not meant to be a faithful reproduction of all that is seen in the field. Rather, it serves to explain certain aspects that are relevant to the study being made. By and large, they should be simple and uncluttered. Annotation is important, but care should be exercised in making short notes rather than an attempt being made to describe the area in detail.

The field sketch should be labelled appropriately, but simply. There should be a title giving the location of the observer and the centre line of the view. A grid reference may be given, and this can be added later by the student back in the classroom.

Sketch mapping

The sketch map is just that. It is not meant to be a reproduction of a Survey map. The sketch map made in the field serves to point out and record those features which require emphasis.

The sketch map is built up as a result of field observations and tells the story of the landscape as viewed from a particular place. These observations are drawn in and annotated so that the sketch map assumes a representation that is not found on a printed map. Observations recorded in this way on a sketch map in plan sharpen a student's awareness of his immediate environment.

Like field sketching, sketch mapping requires practice. Through time, however, students can achieve considerable skill in this technique in the field. The map itself may be drawn completely in plan when in the field, or, to save time, and to add a greater degree of accuracy to the finished product, a base sketch map can be drawn up to students prior to going out. Detail and description can be added at the appropriate time.

Selection of detail for inclusion on the sketch map is an important consideration. The sketch map should explain pertinent points required for a particular study. These points should be annotated simply. They play the role of field notes with the added advantage of graphic representation.

The sketch map requires a title, the north point should be indicated and an approximate scale should be included. The freehand sketch map is not expected to be accurate to any great degree. Depending upon its purpose, the sketch map should be provided with a key or some means of instant interpretation.

The transect.

The transect (cutting-across) is a meaningful way to encourage observation. The transect to the geographer is the traverse to the surveyor. Whereas a traverse requires the continuous measurement of distance and the taking of bearings on fixed points, the transect technique employed by the geographer is less difficult and time-consuming.

Simply, the transect employs a system of recording a journey taken across country. Usually a walk of one to three miles is sufficient for most purposes.

The proposed route across country should be as straight as possible. Outline maps only may be prepared before going out into the field and recording observations between the two selected points. It is meaningful to make a transect across an area where there is change or where change is taking place. This provides the basis for comparison and stimulates thought towards finding some correlations between situations on the ground.

A record is made of what is seen either side of the transect. The observer should record without restraint and the material so gathered will provide the basis for several later lessons. By and large, the transect, if chosen carefully by the teacher beforehand, should provide examples of a variety of relationship between man and his use of land.

Social Studies - History

Well directed and imaginatively conceived outdoor studies provide children with the opportunity to consider suitable concrete situations in the man-made landscape. These studies challenge their inherent curiosity immediately. What they are able to sense provides them with the means to consider changes which have taken place. Curiosity gives rise to interest, and interest to learning. The subsequent extension and gaining of knowledge leads ultimately to the concept that there is change through time.

Care must be taken in choosing a site or situation appropriate to pupil's interests. There will be occasions when the existing indications of change are clearly inappropriate for stimulating the interest of children. For example, a site marker denoting the past location of a house, associated with events of which the children have no knowledge, does little or noghing to excite them. On the other hand, substitute an authentic cabin, add it to the proper furniture, and the interest of children will be aroused and readily apparent. Interest in one aspect will lead to another, and from then on several avenues will be opened up.

By and large, it is reasonable to suggest that the first and most obvious place in which to start historical studies is in the immediate locality, though the time and circumstances available to schools to carry out complete surveys of the locality are limited. Thus caution is necessary in the choice of topics: and depth of study, rather than breadth, is a significant consideration.

Topics may include investigations into settlements and place-names, churches, industry, transportation, military involvement, houses and architecture. From these studies comparisons might be made with other areas, as is often the case with geographical studies (and the inter-disciplinary nature of field work is recognized).

The locality, too, provides a rich field for the study of law, order and civil government. Study of local government may be more pertinent today than ever before with regional administrations being developed and changes being made to the range of services offered as a result of the new structure. Examination of local government and its administration, together with discussions of a seminar type for older students, would draw future citizens closer to the world about them.

Language Arts

Experiences in the outdoors bring many opportunities for valuable and interesting instruction in the language arts. An outdoor setting can provide an atmosphere in which children feel enough confidence to be able to express themselves freely.

In the less formal situation, even the shyest child is likely to take part in activities involving language. Outdoor activities can help children in:

1) listening and responding
2) preparing for reading and vocabulary development
3) organizing and presenting information
4) writing records and reports
5) creative writing
6) dramatization
7) expressing themselves in various social situations

Practising Listening

In activities outdoors, encourage the practice of good listening habits: attention, appropriate response, and readiness to ask pertinent questions. The raised hand signal can be used as a call to attention.

Listening and Describing

On a listening trip, pause often to allow the children to describe a certain bird's call, the noise of feet on gravel or in dry leaves, the hum or buzz of a bee, or some other sound.

See how many different impressions of the same sound can be received and described orally by numbers of the group. Help the children to use original combinations of words and to be interested in creating different word pictures.

Using an Outdoor Setting for the Story.

Read or tell a story in an atmosphere that sets a mood for the plot.

Weaving Sounds into a Story

Make a list of all the sounds heard during an outdoor education experience, giving the sources of the sounds. Use the list as the basis for a story. Let each child (or small group) select one source and imitate its sound each time that object is mentioned in the story. The story may be either factual or imaginary. It can be told by the teacher, a child, or, in sequence, by the children.

Seeing Likeness

Using the child's interest in colourful objects to help him gain readiness for reading. Children can be taught to see the likenesses and differences in shapes. Different rocks can be used in a game of "Simon Says" where the leader says "Simon says, 'Hold up a rock that looks like this'."

Using References

The out-of-doors is an excellent place to teach the use of reference material. Children can use books for making identifications if they are instructed to look at the general characteristics of an object first and then proceed to observe the details. A simple identification key can be profitably used.

Recognizing and Recording New Words

Each time the group has an outdoor education experience be sure to take the opportunity to add new words to the vocabulary. Members of the group may take turns being the recorder who adds to the list of words in a small notebook or on a tape recorder.

Acquiring Words to Describe Sounds

The outdoors furnishes many opportunities for description. For example, a damsel fly can be described as having 'gauzy' wings and a turquoise body on a slender stem.

Learning Words to Describe Sounds

During a quiet period make a list of all the sounds heard, such as rustle, buzz, rumble. Ask for suggestions of words to describe each of these sounds, such as faint (rustle), insistent (buzz), low-pitched (rumble). Encourage the use of these words later in recording the sights and sounds of the day.

Making Individual Collections of Words

Start individual collections of descriptive words related to outdoor experiences. A student might for example list words under headings such as sound, colour, movement and the like. Encourage the children to use these words in pointing out their findings and to listen for new words in the speech of other people.

Enriching Word Meanings

Every outdoor education experience can increase the child's vocabulary and his understanding of what he hears and sees.

The child who has seen, heard, smelled, tasted and felt the wonders of the unfolding earth in spring has a deep understanding of the word 'spring'. And if he has experienced another kind of spring, by watching water bubbling from the earth and seeing the kinds of vegetation that grow at the edge of a pond, he has a new meaning for the word and a basis for comparison of two-word meanings.

Watch for opportunities to emphasize objects or events that will contribute to the enrichment of word meanings.

List and Classifying Descriptive Words

Let the group make a list of words and phrases that could be used in describing some one object - a piece of bark or a leaf, for example. Classify these words and phrases in relation to categories such as colour, size, shape and texture. Then repeat the process with other objects. Let the children discover the nature and the number of the general categories that they need in giving a good, complete description of an object.

Finding the Right Words

Use outdoor experiences to help the children to become interested in finding the exact words needed to convey a certain meaning. Let the children suggest words that describe an event, a feeling, an object, or an action. After listing all these words, help the children to select the word (or words) most effective or appropriate in expressing the exact meaning to be conveyed.

Was an experience exciting, stimulating, fascinating, thrilling, important, valuable?

Was a forest still, hushed, motionless, silent, serene?

Were a sik-sik's movements rapid, agile, nimble, spry, sprightly?

Help the children learn to reject outworn words or slang expressions whose meanings are vague, dulled, or blurred in favour of sharp tools of language that will express the exact shade of meaning desired.

Opportunities to practice finding the right word may be found in preparing directions, reports, definitions, and descriptions in connection with outdoor experiences.

Organizing Sense Impressions

Discuss with the children how they learn by reading books, and suggest that they can 'read' the book of the outdoors by using all their senses. Then help them to organize their experiences in relation to each of the senses.

Having each child put headings on five small sheets of paper - one for each of five senses - and allow time during an outdoor experience to jot down the learnings gained from each method of observation. A list of experiences might appear as follows:

We saw:	various sizes of dogs, some unfeathered birds in a nest.
We heard:	the raspy call of the raven.
We felt:	moist ground air, the rough push of wind.
We smelled:	wood being burned, the fragrance of wild flowers.
We tasted:	the sourness of crisp wood sorrel, the bitterness of a stickly dandelion stem.

Learning by tasting can be hazardous and should be done under supervision. It may be suggested as something to do using familiar foods.

Later, encourage the children to take time to insert descriptive words in their notes to tell more about their sensations. The record of the class may be combined on a chart or charts.

This same activity can be tried at two different seasons and the results compared.

Making labels for a Nature Trail

A temporary nature trail with descriptive labels written by individuals who have travelled the route might be marked out with a series of two-sentence or three-sentence descriptions of interesting sights. Each description could be mounted on cardboard and attached to the object for the people following the trail to read.

Giving Directions for Activities

Announcements and directions given orally or in writing offer opportunities for organizing and presenting information.

Taking Notes

Careful note-taking can be of great help to children in their outdoor experiences, and special attention should be given to the skills involved. Discuss with the children the need for:

1) listing only the most important items of information.
2) writing legibly
3) recording enough information to provide material for discussion.
4) abbreviating long or difficult words.
5) using separate sheets of paper for different topics.

Spiral steno book with a string tied through the coil attaching a pencil is best for field work.

Making a Record of an Outdoor Activity for the Group

If the class is divided into small groups, each having a record-keeper, a number of children can be given this learning experience.

The record might take the form of a log, with entries for different parts of the activity written by different members of the group. In this procedure, each child in the group might have an opportunity to record observations.

Keeping a Diary of Developments

A group diary or an individual diary of a particular development will be an objective record of growth in language arts skills, as well as of skill in observation if it covers several months or a year, and will provide a particularly valuable experience if the class can visit the same site during each season of the year.

Describing Sounds in Writing

Permit each child to listen carefully to sounds in the outdoors. Then have him write in his own words the best phrase or short description that will convey to others what each sound is like to him and the impression it makes on him. He should strive to increase not only his awareness of sounds, but his power of communication and interpretation - conveying a feeling or a mood as he describes the sound.

For example, a bird's call impresses the venturesome student as a 'shrill scream, warning of danger hiding in the mysterious unknown.' Another student hears in a bird's call 'a brooding note of sadness echoing over the otherwise silent enchantment of the land'

Sounds made by twigs breaking under foot, the scurrying of small animals, a frog in a pond, the movement of leaves in the wind, water trickling over rocks - these and other sounds provide opportunities for practice in description.

Each child should come to recognize creative writing as that which provides a vivid portrayal of impressions. It is writing that conveys a personal 'colouring' and feeling that make others sense and feel and react in the way that the writer wishes them to.

Permit the children to compare their description of sounds. Help them to note and to appreciate words or phrase that are especially effective in conveying impressions and feelings. And point out the differences in the impressions that the same sound may make on different people. Above all, lead the children to see that in gaining word power they are gaining power to transmit their thoughts and feelings to others and thus to influence the ideas and attitudes of other people.

Writing One-Sentence Descriptions

Build upon the work begun in the preceding activity by having the children write one-sentence description of simple things that they observe - for example, the texture of a stone. Encourage the children to use words that make descriptions distinctive.

Describing One Phase of a Storm

As a storm approaches, the class can study the sky, observing the wind and snow in action and the results of their fury. Encourage each child to choose one phase of the storm to study and describe.

Phases of the storm that might be chosen include:

1) changes in clouds and cloud formations
2) the action of snow above the ground (in the air, in the trees, on roofs and buildings)
3) the action of the snow on the ground (changes in the surface of the ground, water direction and flow, effects on bare soil and on soil covered with vegetation)
4) the behaviour of trees
5) the behaviour of people and animals in seeking shelter
6) the amount of thunder and lightning and their effects
7) the duration of the storm and its changes in intensity

Giving a News Report on Storm Damage

After a storm, let the children explore a certain area and make observations of storm effects of storm damage; then have them write a news report on their observations.

Writing Tall Tales

Let children develop their imaginations through written interpretation of the events of a hike in the form of a 'tall tale'. Divide them into small groups when they return from a class hike. Each group can then prepare its story of the trip. Some of these stories might be gathered into a booklet of outdoor tales.

Writing Poems

Reading several short descriptive poems during a quiet period can serve as a motivation for the writing of poetry. As each poem is read, direct attention to the central thought that is expressed.

Continue to help the group to find words that create mental images descriptive of the things they have observed in nature.

Preparing a Booklet to Review a Season

As review at the end of a season, the class might write - and perhaps illustrate - a booklet giving their concept of the sights, sounds, smells, tastes, and other sensations of the particular time of year.

Collecting Writings

Writing which results from outdoor education experiences could be collected in a loose-leaf book for the library. There might be sections for descriptions, accounts of experiences, poetry, 'legends', tall tales, vocabulary list, observations and explanations of phenomena.

Dramatizing Action Observed Outdoors

Attentive observation is required to prepare for dramatizing movement or action seen outdoors. Children can observe the actions of animals and the movement of plants in the wind. Later they may act out these things.

Presenting Charades

Charades that portray new additions to vocabulary from outdoor activities - perhaps words such as hibernation, chrysalis, migration, flipper - can be used in language arts.

Evaluating an Activity

At the end of an outdoor education period, the evaluation of the activity offers a natural way to practice discussion techniques.

The discussion may be an informal one, consisting mainly of answering these two questions: 1) What did we do?, and 2) What were the most important parts of our activity - what did we discover, learn or experience that will be useful to us?

But it may be desirable to follow this more detailed pattern for the evaluation discussion:

a) Defining and describing the activity.
b) Identifying the important parts of the activity.
c) Presenting various points of view on the value of the activity.
d) Extending the understandings that have been gained.
e) Expressing conclusions systematically.

Interviewing People in the Community

The skills of interviewing can be practiced when the children talk with the old people about the history of the area; with outdoor workers about their occupations, as related to nature; and with others who can help them to understand their community life and its natural basis.

Using Interviews in Preparing Reports

Children might well interview various adults and also some members of their own class in gathering information for reports on the outdoor activities of the class. The reports could be prepared for use on the bulletin board, for the school paper, or for reports to parents.

Mathematics

Mathematics can be kept too close to the exercise book. It originated in the outdoors as an important aspect of man's everyday life. The measurement of time, the measurement of land, the building of pyramids, and other such activities in the out-of-doors put mathematics in everyday life.

The child can see geometry in life all about him in tire treads, in advertisements, in tree limbs, in land formation, and in many other outdoor objects.

If school instruction is to become more meaningful, outdoor education must be used to enrich and vary the pupils' concrete experience.

Actually an analysis of different mathematics concepts taught at the different grade levels: counting, adding, subtracting, multiplying and dividing - show that they can be put to practical and purposeful use in outdoor activities. Through firsthand experience in the out-of-doors with meaningful projects and activities, mathematical abstractions of the textbook become vital and meaningful in the everyday life of the children.

Measurement and distance can be brought into the outdoor program by asking the question, "How far is it to that marker?" This question will bring many reactions from the students. Those who don't know how to estimate a short distance soon learn how to compare a segment of unknown distance with familiar lengths such as one's own height. In judging distances the children should have the chance to learn just how far 100 yards really is.

This can be done by measuring off 100 yards with a tape measure and letting students count how many steps it takes them to travel this distance. This will always come in handy because there are many games which take place over a distance of 100 yards and the students can actually set up the court or playing area without a tape measure.

What is the size of an acre of ground?
What is the depth of a pond?
What is the height of a building?
What is the power of a bombardier?

All of these concepts have more meaning through observations and mathematical experience.

Each student can judge how tall a building is by using his or her own shadow. Student (A) who knows how tall he is, stands at the base of the object which is to be measured, (lining his shadow up with the shadow of the object to be measured) while student (B) marks the point where his shadow ends. Student (A) then moves up to this mark and the process is continued until his shadow comes to the end of the object's shadow. To find the height of the object, student (A) takes his height times the number of shadow lengths marked off in order to reach the end of the object's shadow, therefore, giving the approximate height of the object.

The students can also determine the distance to the building or other objects without pacing it.

This brings up another phase of measurement. Recalling the classroom work with similar triangles provides background for the solution of the problem. Judging the width of a river can be solved by using the methods of similar triangles and the pythagorean theorem. All this enables the group to estimate the distance fairly accurately in relation to the solution obtained by indirect measurements.

Simple geometry, the use of square root, and other classroom learning becomes better understood as children actually see that all these techniques help solve problems which have meaning to them.

The cost of a school trip should be determined by the class previous to the trip.

A few additional activities might include:
Plotting a graph of the weather.
Determining the age of trees by the angular rings on a fresh-cut stump.
Hiking with a compass.
Making a scale map of the site.
Operating a stop watch to determine the speed of walking.
Planning amount and cost of foods for cook-outs.

Construction of bridges, stiles, shelters, feeding stations
Pacing distances in hiking
Estimating and measuring distances between trees or buildings
Laying out field or activity areas
Staking out an acre of ground
Measuring board feet in a piece of lumber or in a building
Measuring the circumference and diameter of a tree
Estimating the board feet in a log
Estimating and measuring dimensions of a building and reporting on percent of error
Estimating and measuring the percent of slope
Estimating and measuring the height of trees through the measurement of shadows
Determining the distance away of lightning
Estimating and measuring the width of a river or lake
Finding the amount and cost of gravel for a road bed
Counting the average number of trees with specific characteristics in an acre

Path-finding

There is a real satisfaction in mastering the art of using map and compass for finding your way through the woods and/or over the hills. Hours of fun and fascination await those who master these skills. Usually path-finding as a sport is thought of as an activity by foot, but it can be done with great success by snowshoes, skis, boat, and snowmobile. The ultimate of those described, however, is cross-country path-finding by foot. There are many different types of games or contests. Because of the limited space only a few of the more popular competitive contests are included. Regardless of what type of path-finding is engaged in at your school, a course of teaching and practice skills must precede the advanced program.

Perhaps it would be helpful, however, to mention the sequence of teaching basic skills that should be followed preceding path-finding.

1. Compass and parts of it; cardinal points; physical principles involved in the working of compass; the degrees as related to circles or half-circles.
2. Maps, types of maps, map symbols, scales, longitude and latitude, contour lines, declination, orienting of maps.

Score Path-finding

Score path-finding is one of the simplest to organize. The area chosen for this type of competition is dotted with a number of control points (10-20). There should be more controls placed than possibly can be visited by any one individual or team in the allotted time. Each station is assigned a specific point value. Stations do not have to be followed sequentially. The object is to plan the route so as to accumulate the largest possible score within a certain time limit. The score for each station varies according to its distance from the starting point and the difficulty in reaching the station. Each station has a number or symbol which is written down by the participant when he reaches the point to prove that he reached it. The secret here is in selecting the best and fastest route in order to reach as many high-scoring stations as possible.

For everyone exceeding the time limit, some form of penalty system must be used, such as a deduction of 3 to 5 points for every minute late.

This form of event is particularly good for younger groups whose physical capacities and path-finding competencies are not fully developed. Score path-finding may be done using only a map.

Route Path-finding

The participants are to follow a route in the area, indicated on a master map, which they copy on their own maps. The route should be an easy one to follow: along small roads, trails, creeks, etc. On the route, there are consecutively numbered stations marked with flags, which locations the path-finding have to mark on their maps. Time is not a great factor here; however, a maximum time limit should be set. Large and easily seen markers should be used and they should be located at significant points on the map. The winner is the one who has visited the most points correctly on the map.

Project Path-finding

This type of path-finding is combined with other skill performance on the path-finding route. Camping skills, woodlore or any other outdoor skills could be tested besides path-finding skills. At each station, perhaps the path-finding or team has to saw or chop a log, build a fire, boil water, or set up a small tent.

Nature and conservation also may be included in the hike by identifying trees, flora, or rocks. Even arts and crafts may be incorporated. The mechanics of this type of path-finding calls for imagination by the organizer.

A minimum of equipment for a program requires a number of detailed maps, topographical maps of surrounding area at 1:50,000 or larger scale, and a number of compasses. Any school that is planning to start a path-finding program or wishes to enlarge its present program should write:

Canadian Orienteering Service,
77 York Street,
Toronto, Ontario.

Cross-Country Path-finding

This form of path-finding is generally regarded as the supreme form of this sport because of its requirements for physical prowess combined with an ability to handle map and compass well, and to make quick, intelligent decisions. With younger students it is advisable that 2-3 children cover the route together. In cross-country activities the competitors have a designated start and finish and they race against time to complete the course. A 'bee-line' should be drawn from the starting point to the destination, then the map should be consulted to see what deviations from this straight line are necessary to get to the destination in the quickest time. It may be faster to skirt a steep hill rather than to try to go over the top, or there may be a marsh in the line of travel and the best alternate route must be selected. For advanced cross-country, the start and finish are located close together but a designated number of points are established on the map. The participants must convert these points to field readings and find their own paths from point to point. Points are listed with instruction for location of the next point on the map. The instructions may include the name or symbol of this location on the map, the direction (bearing) and distance away; Instructions for locating the point will often have to be given in terms of direction and distance from a letter in a word printed on the map, such as River Bend, 1/2 inch north-east of B. in Willow Cove.

Science Activities

This section deals with outdoor science activities. A variety of techniques and activities suitable to various grade levels have been included.

An ideal place to start outdoor education is the school area and its immediate surroundings. Some of the following activities could be done in the school yard, some in areas close to the school.

1. Soil Erosion - causes and prevention

Aim: To help students realize that through man's carelessness many undesirable changes in our environment have occured.

To help students understand that land can be damaged by erosion caused by removal of soil cover, floods, human actions and lack of plants.

Method:

The teacher chooses an area where signs of erosion are very evident. This field trip should be taken during or right after a heavy run off if possible. Children should have the opportunity to examine the eroded area, feel the soil, observe water washing the soil away, note the absence of plant life, colour of soil and signs of animal life. Samples of the soil may be taken as well as a sample of the muddy run-off water for later study.

Pupils may measure width, depth and length of some of the gullies and record them.

Drive wooden pegs at the edges and head of each gully. After several more rainfalls/run-offs pupils may measure the same gullies again, and they will observe a growth in the gullies.

Follow-up:

After the trip students will observe soil samples noting colour and presence or absence of plant or animal life.

Allow the sample of muddy water to sit until soil settles. Discuss with the class "What is muddy water? Why do you think streams and rivers are muddy after heavy rainstorms?"

2. Trees (as appropriate)

Take an early fall trip and help children identify the trees in or close to the school yard. Small groups of children can keep a record of an individual tree for the rest of the school year. The record might include:

Fall

(a) Type of trees
(b) When did tree lose its leaves?
(c) Measure diameter and height of tree.
(d) Were there any birds' nests?'
(e) What kinds of plants grow under the tree?
(f) Are there any insects on the bark or leaves of the tree.
(g) What birds and animals visit the tree?
(h) Others.

Winter

(a) Make a diagram of a small twig.
(b) Carefully open and observe a bud.
(c) What colour is the bud inside?
(d) What animals or birds visit the tree?
(e) Are there insects on the tree (pupae or eggs).
(f) Have any animals made their home in this tree.
(g) Has anything fallen from the tree?
(h) Others

Spring

(a) When did the buds first start to swell?
(b) When did the leaves first appear?
(c) Did anything appear before the leaves?
(d) Draw a sketch of the flower.
(e) How long does it take a leaf to reach its full size?
(f) Are there any branches without leaves on them?
(g) Did you notice anything coming from the bark?
(h) Measure how much growth has taken place in ten small branches.
(i) Others.

3. The Study of a (Pond) community

Aim: To help children to understand the interrelationships that exist among all living creatures within a 'community'.

Method:

Collect, identify and observe pond insects and pond life (insects should be returned when study is finished). Investigate the animal and bird life at the edge of the pond. Observe and identify plant life in and around the pond.

Follow-up:

The follow-up studies could include (a) the life cycles of typical pond insects such as the dragonfly, damselfly, or caddisfly, (b) the construction of simple food chain diagrams, (c) the discussion of producers, consumers, decomposers.

Note:

This type of study can be adapted to any grade level. A much more intensive study can be done with older school students. A variety of studies can be done in many communities for example, swamp, stream woodlot, schoolyard, and others.

4. As well as the community approach, a specific study of a particular topic could be carried out, for example, caddisfly - types of cases, habitat, habits, food and so on. Children are asked to investigate the following two examples:

(a) Study of a Tree Stump (as appropriate)
    (1) What kind of tree is it? (bark, colour of wood, small shoots growing from base)

(2) How old was the tree? (count the annular rings)
(3) Are the rings all the same distance apart? Why or why not?
(4) Are there any signs of damage? (fire, insects)
(5) How can you tell a good growing year. A poor growing year?
(6) What may have caused a poor growing year?
(7) Are there any signs of animal life having visited the stump? (insects, mammals, birds)
(8) Are there any plants growing in the stump's decayed material?
(9) Are there any signs that tell you what may have happened to the tree?

5. Insect Studies

Several beneficial field trips can be undertaken to study insects. A first field trip can be taken to collect and identify the insects of specific areas. A population count of various insect species could be done. Such numerous species as grasshoppers or crickets would provide a suitable study. If a population count is to be done, the group should collect between 30-50 of one species and mark them in some way with paint or coloured nail polish, making sure they are released in the same area. Later in the day the group should collect the same number of insects as were marked earlier in the day. The number of marked insects should be noted. The formula for the population count is:

$$\frac{\text{number of collected and marked X number collected the second time}}{\text{number of marked that are recaptured}}$$

Another field trip might be devoted to the intensive study of one particular species of insects. Children could be encouraged to follow an insect for 10 to 15 minutes and repeat this procedure with other individuals of the same species and try to answer the following:

(a) How does the insect move?
(b) What does the insect eat?
(c) How does the insect eat?
(d) How fast can the insect travel?
(e) What type of community does the insect live in?
(f) Did the insect meet any other insects or animals? What happened?
(g) How does the insect breathe?
(h) How is the insect protected from extreme temperatures?
(i) How is the insect protected from man and other animals?
(j) Is the insect beneficial or harmful to man? Why?

Numerous follow-up activities can be carried out, for example, the mounting of moths and butterflies, diagraming insect food chains, raising ant colonies, maintaining bee hives and so on.

6. Winter Activities

There are many science activities that children can do during the winter.

1. Bud Study	Details	Equipment Needed
25 minutes	observe and sketch	pencils, reference books

	treed area	formation, size, scars; compare different types; identify the tree (s)	
2.	Bark Impressions		
	25 minutes treed area	get impressions by tracing with a large lead pencil; do at least 4 different trees - identify them and make comparison	reference material large primary pencil or charcoal; paper
3.	Snow Observations		
	25 minutes open spaces and/or treed area	distance between drifts; observe the laying of drifts examine a cross-section of a drift; compare snow drifts or layering near deciduous and coniferous trees - use sketches and diagrams recording observations	pencil reference material
4.	Water Temperatures		
	pond area/ coastal area 30 minutes	take temperatures of pond water at every 2' depth - make a graph	pencil, thermometer with a string, reference material
5.	Snow		
	25 minutes near school	get snow from school area, and elsewhere and pack it - melt it slowly - do several times - obtain a ratio of snow to water volume - do several times	hot plates, pots, reference material

7. The Study of Animal Tracks

A field trip to find animal tracks can be very interesting. Students should be provided with materials to help them identify the tracks.

Plaster of paris casts can also be made in the snow under freezing temperatures. The track should first be sprayed with a mist of water several times. Place a collar of cardboard around the track. Adding snow to the plaster ensures that the plaster will not melt the track. Allow time for the plaster to set and these will be good negative from which one can make positive casts back in the classroom.

8. Deciduous Trees

Trees can be identified in the winter by examining the general shape and the bark.

REFERENCE MATERIALS

Outdoor Education (2 vols.),
Ontario Teachers' Federation
(available from Curriculum
Division, Yellowknife, N.W.T.

The Young Naturalist,
Federation of Ontario Naturalists,
1262 Don Mills Road,
DON MILLS, Ontario.
(periodical published 10 times
annually - $3.00 per year)

Outdoor Education, Smith, J.W.
Prentice Hall Publishing Co.,
ENGLEWOOD CLIFFS, N.J.
($7.95)

Canadian Scout Handbook,
McGraw-Hill Co. Ltd.,
330 Progress Ave.,
SCARBOROUGH, Ontario.

Peterson Field Guide Series,
Houghton Mifflin Publishing,
(Thomas Allen and Son, Ltd.,
50 Prince Andrew Place,
DON MILLS, Ontario.

PHYSICAL EDUCATION

Physical education is not viewed as a program of spartan training for athletic pursuits, but as the totality of a broad field of behavioural sciences. Living is a matter of communicating, the way in which people communicate is the way in which they live, it is their culture: through communication-interaction, people learn to survive; to understand, to adapt to, and to control their environment and each other. It is their learned behaviour: thus culture, communication and behaviour are not only synonomous; but are manifestations of the patterns of human interaction which are constantly in motion.

The substance of the physical education program must reflect and be an integral part of the cultures of the peoples involved: this spectrum must be sufficiently broad in scope to encompass language - both verbal and non-verbal; linguistic behaviours particularly re. temporal and spatial relations; ceremonial rites and dances; attitudes and values; traditional games and activities; to make provision for those established mechanisms of the cultures which are concerned with both physical and social well-being; and to be especially aware of those motifs which indicate an inter-cultural "difference".

Nothing occurs in a vacuum, neither can any program be conducted in isolation: it is this aspect of relationships, and inter-relationships which must be recognized and adjustments made throughout all program planning for its implementation. The decisive factor is the quality of the experience, which is primarily dependent upon the quality of leadership and the learning situation itself.

The school has a tremendous responsibility in the field of behavioural sciences, and at the present time these are particularly in the concepts of education-recreation-leisure, centred in constructive activities of common community concern. The articulation of these relationships is likely to be achieved when the school balances its institutional activities with those of community interest and desires.

EDUCATION, RECREATION AND LEISURE

Education and recreation are not identical ideas: They are complementary and supplementary, each having its own distinctive features: they should be viewed in sythesis rather than in separation. Schools are deeply concerned with compulsory attendance, subject matter and educational outcomes whereas, in recreation the emphasis lies in the enjoyment of the activity, and in the individual's freedom of choice and pace. A classroom is only one of many variable and dynamic factors in a child's life; however, it is in the classroom that he is exposed to a designed, controlled, multiplicity of experiences which are aimed at preparing him to be a valued member of his community and society at large As he is stimulated by this wide spectrum of activities, it is essential that his interests be fostered and cultivated to the maximum, by reducing the time-lag between initial motivation and pleasurable reinforcement. The implications of this are clearly that: -

(a) Classroom, laboratory, gymnasium, etc. activities should all reflect the interest stimulation, intrinsic motivation, and joyful 'zing'of free participation - which are usually associated with recreational activities!

(b) Many of the activities presently termed 'recreational' must become more educationally oriented, i.e. by selecting activities of vital significance re. values to the individual and the community; and by realizing those values in such a way as to enhance the values, and the enjoyment of the activities.

(c) The school has a direct responsibility to develop its concept of curriculum to include activities of an informal nature, which would evolve into after-school programs, clubs, weekend programs, and summer programs; thus enabling both children, youths, and adults to participate in and extend their active interests.

(d) In making decisions as to which activities to include in a program, an important consideration to weigh is the "carry-over" impact: in light of such societal trends as the shorter working week, the absence of a wage-earning economy; the guaranteed annual income society; the importance of leisure pursuits as emphasised (Point No. 7) in the report on 'Northern Development'; such a program must reflect and consider the inclusion of activities which can become recreational pastimes in adult-life. E.g. curling, square-dancing, macrame, etc. are becoming accepted pastimes in settlements. It is essential that the popularity of an activity be considered.

Serious consideration must be given to the fact that school facilities represent the greatest single investment of government funds in every community: it is sound business practice and common sense to utilize these to the maximum potential. It is incumbent upon teaching staff, Local Advisory Boards, and the education administration to ensure that in each community: -

(a) There is provision for adequate and enthusiastic leadership, which will be responsible for the community-education-recreation program.

(b) There is full co-operation with other community and government agencies which conduct or are interested in the development of recreation programs.

(c) In addition to the provision of physical facilities, the community teaching staff should be given the opportunity to participate in any inservice community programs re. the development and leadership of recreational activities; and be permitted to act as resource personnel on the request of the group involved.

(d) The program of recreation should consist of a balanced program, consisting of many and varied activities which are directly related to the needs, interests, and abilities of all the people and the practicalities of the settlement. The school should take the initiative of providing such programs for both children and adults.

(e) Opportunities for recreation and leisure pursuits be sufficiently stimulating in order that they may play a strongly significant role in the preservation of an individual's mental health, and allow for the release of emotional energy in a style acceptable to the society.

(f) Programs of educational-recreation should include all aspects of Outdoor education, with particular emphasis upon environmental studies, conservation, and survival.

The extent to which children and adults voluntarily participate during their leisure in the activities of educational-recreation as conducted by the school, is one direct measure of the effectiveness of teaching! The provision of recreational opportunities gives meaning, purpose, and direction for effective education - in the same way as a library is significant to a reading program. Interwoven throughout all phases of the school's total program should be the concept of education for life and living.

ATTITUDES AND VALUES

Attitudes and values regarding athletic pursuits and 'playing' differ tremendously between and within cultural entities. It would appear that profound conflicts can arise, e.g. in the concept of games. The playing of games and sports is concerned with the interaction of individuals and groups of varying size, either through competition, or co-operation, or both. Games, e.g. football, hockey, etc. are by their very nature structured, ritualistic, role-playing activities, and which are dependent on established rules: they may be social for both participants and spectators, but they are not characteristically creative for either. Points of cultural conflict may well arise: - re. the organized disciplined violence which is often evident in sports; the fact that only the "best" players can take part; that uniforms, referees and training disciplines are not only alien behaviours but are distasteful; that such concepts as "winning" and "competitive spirit" are totally foreign and unacceptable; that the required role-playing is inappropriate re. cultural sex-roles; and that the implicit extrinsic motivation is meaningless. Such points of conflict may be countered by "silent responses", e.g. the teams simply do not appear for practices, or matches and individuals may respond with "too hot", "too sick", or "really silly"! Superficial similarities in certain community activities may be misleading to the casual observer, e.g. during the srpingtime, in many northern communities, it seems as though the total population is involved in playing "soccer" all 'night': this activity actually bears little resemblance to soccer, and its purpose is in providing a socio-psychological release for the participants in a culturally accepted from.

In contrast to the structured forms of organized team-sports, some cultural groups have developed a keen response and involvement with "play activities": these are essentially individual activities which permit variation and unlimited creative opportunities, without any restriction of time or place; these activities are "toy-centered". Guns, cameras, typewriters, sewing-machines, fishing-rods, radios, musical instruments, tools, and computers are examples of "toys": further extensions of the 'man-machine' games are the activities which are involved in flying, driving, skidooing, skiing, sailing, water-skiing, etc. These 'man-machine' relationships spring from deep intrinsic motivation; are centred upon enjoyment, exploration, and imagination; involving varying degrees of skill and expertise; and providing the individual with a particular exhilaration and satisfaction.

With particular reference to the school physical education program, it must be recognized that the children of all cultures may wish to, and should have the opportunity to participate in games and activities "just for the fun of it".

KINESIC-LINGUISTICS

Kinesic-linguistics - the most important aspect of human communication behaviour; this, above all, is the "Life rhythm".

A Behavioural Science

Human communication appears to be a function of both speech and body motion, inextricably locked together within the flow of behaviour reinforcing and counterpointing one another. There are complex and multiple orders of change which, in the emergent configurations of their inter-relationship with each other, appear to be responsible for the creation of patterns of expressive behaviour.

Language in its natural occurrence as speech, is never disembodied but is always manifest through behaviour: -

E.G.: - What does the lowering of the voice, "while" the eyes widen, "while" the eyebrows are raised, "while" an arm and finger move, "while" the head lowers, "while" a leg and foot shift, "while" the face flushes.....have to do with, what was said or was left unsaid? This is modified by the equally complex configurations which immediately precede and follow it: all the changes in turn - as given in this example, are related to the similarly involved behaviour of the other person (s) in the interaction.

We are quite often very clear about what a person said and meant, but we cannot tell precisely how he accomplished it or how we were able to accomplish our understanding of it.

A sound and motion film of human behaviour overwhelms the observer with a rapidly flowing and shifting scene of sound and motion; there appear to be no clear-cut boundaries or dividing points, that divide the flow of events into separate segments: except by using a slow-motion projector, and intensive analysis of a "given frame." Directionality with reference to the study of body-motion, (kinesics), refers to such factors as the maintenance of change in flexion/extension; pronation/supination; abduction of joints; in addition to the forms of movements characteristic of the head, eyes, mouth etc. These diverse body-parts - eyes, head, arms, fingers etc., tend to change and sustain direction of movement, it does so accompanying and in accordance with other parts of the body moving at that time. Behaviour occurs as a flowing and emerging pattern of configurations of change, a configuration where the body parts are sustaining their directions of change together - and will be succeeded by another configuration which in its turn is followed by yet another.

There is no point at which there is non-change. This is an attempt to describe the on-going flow of "movements of sustaining together" of the parts of the body; i.e. a process unit.

A "process unit" can be defined as the initiation and sustaining of directionality of change of the parts of the body with each other - the specific directions being sustained by the individual parts may differ; across a given moment of time; - as contrasted with the preceding and succeeding sets of similarly sustained configurations of movement of parts of the body.

We are dealing with ordered patterns of change during change; rhythmic and varying patterns in the temporal sequence of changes. These complex, yet determinable relationships express an organized process within continually changing relationships. The components of behaviour are not discrete and isolated events which are combined to form behaviour, they are regular and predictable patterns of change within behaviour.

Behaviour occurs as patterns of "whiles", of person speaks connecting segments of sound; - "while" the eyes and brows move; ...."while" arms, hands, and fingers move; "while" the other person/s move. Behaviour IS what they all are "while" they occur.

For example: -

A	ROU	ND
Hd. up slty.	Bk. up slty.	Down.
Eys. L. slty.	Widen	Rt. slty.
Mou. twd. & purse	Open & wide.	Close bk./narr.

……

Self-Synchrony: The organization of change of the body-motion whilst a person is speaking occurs synchronously with the articulated, segmental organization of his speech. The body dances in time with speech. The example of the word "around" shows the precise harmony of body-movement as a person articulated that three syllable word. Breath, pulses, laughter, crying, pauses like "umm" and "ahh" etc., also occur synchronously with body motion.

Interactional Synchrony: The person or persons interacting share patterns of bodily change in precise harmony with the one who is speaking; changes in the speed of movement are also shared by the group. There appears to be a marked rhythm point in communicational behaviour. If one observes two or three persons eating a meal and conversing together, it can be observed, albeit casually, that they do interact in terms of kinesic-linguistics; if one is speaking, the other two will move their knives and forks in an exact rhythmic pattern to the speech of the speaker. All three will sustain interactional synchrony, but if two are conversing, the third one will share the same direction of change with the other two, and change synchronously with both.

Dyssynchrony: is never observed in normal behaviour. The rhythmic body-dance of the normal person, individually or in interaction, is absent when there is 'pathological disorder'.

NON-VERBAL CODES	**VERBAL CODES**
Are based upon continuous function; e.g. continuous movement is involved as long as an organism lives.	Are based upon non-continuous function: e.g. sounds and symbols (letters) have a discrete beginning and end.
Are governed by rules and principles which are based upon biological necessities: e.g. reactions which indicate fear.	Are governed by arbitrary rules and man-made principles: e.g. syntax and language rules differ in various culture groups.
Are an international, inter-cultural, inter-racial, and inter-species language: they are the basis for communication with an out-group.	Are used as culturally specific language: these are adapted to communication with the in-group.
Can indicate successive events simultaneously: e.g. different signals can be given	Must indicate simultaneous events successively: e.g. a spoken or written re-

at the same time: cf. 'come' & 'go'. Signals are flexible re. time: e.g. they may be fast or slow.	port consists of words which are placed in a series. Verbalization becomes unintelligible when too fast or too slow.
Are excellent for indicating timing and co-ordination, but inefficient for indicating an elasped period of time.	Cannot indicate space, except by description of limits, edges. Are excellent for indicating elapsed time, but not timing.
Can be perceived alike over distances and near locations: e.g. a scream can be both seen and heard, causing a physical impact and reaction on the receptors.	Can only be perceived over a distance by being transmitted to the receptor through a man-made device: e.g. radio, tapes, telephone, television.
Influence perception, co-ordination, integration; and lead to the acquisition of skills: evaluation is developed from the appreciation of similarities & differences.	Influence thinking and the acquisition of information: evaluation is governed by the principles of logic.
Their expression may be skilled or unskilled, but they are understandable regardless of the quality.	Unless the verbal expressions are skilled they are unintelligible.
Are based upon the receptors empathetic assessment of biological similarity for their understanding: e.g. pain is universally comprehended.	Are based upon prior verbal agreements for understanding: e.g. the word 'pain' differs in each language, and its significance is bound within a specific language.
Actions and objects exist in their own right, fulfilling both practical and symbolic functions.	Words do not exist in their own right, they are symbols representing abstract events.
Are subject-oriented and have an emotional appeal: i.e. an intimate language.	Are predicate oriented and have an intellectual appeal: i.e. a distant language.

NON-VERBAL BEHAVIOUR IN THE CLASSROOM

The child or a young adult frequently finds difficulty in explaining or even describing his problems, - such verbal logic in a child's first language can present great difficulties and should not become an issue between the child and teacher. such verbalizations and all the implications thereof, in the child's second language, constitute an unreasonable expectation and demand. The first indication of any kind of problem will be revealed in non-verbal behaviour; in the school situation these are especially evident and tangibly demonstrated in the early years. Acute observation and accurate record-keeping show that discipline problems, destruction, non-attendance, frustration and boredom are shown non-verbally in the pre-school programs: e.g. a child who is finger-painting until he is clawing holes in the paper; e.g. the child who systematically crayons on the furniture; e.g. the child who constantly retreats to the bathroom or other 'inaccessible' place; e.g. the child who attends for a brief time, disappears, and has no inclination to return; e.g. the child who maintains an incessant whistling, drumming, or rocking motion. Such strong statements presented in non-verbal behaviours cannot be ignored: they must be reviewed in light of the total program, the environs, the home, health conditions, and all the interpersonal relations and activities involved.

Likewise physical disabilities, sensory-input deficiencies, and intellectual incapacities are all displayed in non-verbal behaviours. The majority of cases again being evident in the early stages, - at which time often adequate and appropriate remediation can be obtained: e.g. the 'hunchbacked' boy with a walking problem, - his snowpants strap were so long and his fear of embarassment so great, that he compensated by adopting a unique pattern of non-verbal behaviour! It is essential that for maximum opportunity for each child, and for the development of an effective learning-teaching situation that non-verbal indications receive most serious consideration and help: they may indicate an easily remedied condition, or a condition which will require a team of specialists. For example: the particularly clumsy child; the child who appears to be a deaf-mute; the child who appears to be bolour-blind, etc. It is essential that records be kept and the appropriate agencies contacted as soon as possible for a team approach to be effected re. diagnosis and guidance. Particular consideration must be given to inter-cultural factors and linguistic behaviours.

MOVEMENT-DRAMA-DANCE

The innate drive of children to perform dance-like movements is an unconscious form of outlet; it introduces them into the world of the flow of movement; to the strengthening of their spontaeous faculties of expression; to preserve the spontaneity of movement; to the development of aesthetic expression in the primary medium of movement; to the integration of intellectual 'knowledge' with creative ability; it helps to relieve frustrations; to relax tensions; and to develop a balanced growth.

In movement, children explore the feeling of being strong and sturdy, of being quiet and slow, of stamping heavily, or of being relaxed. In experimenting with these qualities, they inevitably create shapes and patterns in space; there is no hard and fast line between dance, movement and drama. Movements may lead a child to characterization, or an animalization; resulting in dramatic-movement rather than dance-movement; when this is extended to a group of children - a dramatic pattern is evolved. As the child develops, his power of sustaining ideas should increase, together with his power to evolve patterns - dramatic, dance-like, or of dance-drama kind: both as an individual, and as a group member - who is able to co-operate, collaborate, and improvise freely and easily. In the early stages, caution should be used regarding the over-emphasis of using isolated parts of the body, for too many movements: the need is to use the whole body as a means of expression. The mind-body relationship should be developed in a happy unity; without the inhibition of one, or the over-development of the other. Individual movement should develop a richness, a variety in quality; it should support and sustain exploration and expression of ideas, and help the child extend his total uniqueness. Guidance - on occasion may be an explicit direction, alternately it may be indirect through atmosphere and rapport, but in a stimulating environment.

A 'class' is comprised of individual children, who are in varying stages of physical, intellectual, emotional, social, and neuro-muscular growth; with tremendous economic, ethnic, & social status differences. Recognise this, and plan accordingly: however, the one common factor in any group is that of movement; a naturally healthy child loves to move, he learns through movement.

One must provide a great variety of experience in movement - for each child, by sensible use of the body; and maximum use of available facilities and equipment.

Children must be able to experiment and to develop their own ideas in the creation of movement; they should be encouraged to think and to consider 'what', 'when', 'why' - they are going to do, the space available, their individual production of patterns, movements. A variety of thoughts, actions, moods,....of interesting, involving, exciting stimulii....with such a basis, the quality and quantity of their creative imagination has unlimited potential. With guidance and encouragement, the child will begin to develop his own basic movement vocabulary.

One must understand the principles of movement; there are many approaches but experiments should be conducted on oneself firstly. Flexibility in approach, using other ideas as the need arises - there is no guide for this, only one's own sensitivity, and perceptual awareness based on experience.

One must believe in the needs of the individual child, adapt one's techniques and media to him; plan opportunities in which he is given scope to use his own ideas in movement; so that child and adult may together develop a kind of working empathy. Know oneself; help the child to gain a sense of satisfaction: of a happiness.

Time Factor. All movements take a degree of time to perform. Long/short: fast/slow. In the early stages, it is easier for the young to move quickly; because a slow sustained movement requires greater control and concentration. A movement may be totally slow, or a totally fast tempo: it may start suddenly and gradually slow down; it may start slowly and gradually build up to a maximum speed - then stop abruptly - or slow down as gradually as it began. This later develops an infinite variety re. relation to body weight and space relationships. Children should have a chance to experiment with these ideas - total body involvement, different parts of the body, in different spatial relations; contrasting tempos - to help them feel the differences of speed - in relation to themselves: to stimulate the exploration of possibilities.

"While the child is practicing exercises, he cannot grow into a problem-solver. While he is slavishly driven by the purposes of others, he cannot grow into a free man". Marie I. Rasey.

Space Factor. All movements, regardless of time and speed, occur in space..... There is a limited volume of space surrounding the body; extending back and forwards, up and down, left and right, and diagonally in any of these directions: the body is constantly and continuously changing and inter-changing its relationship to any volume of space.

At first, children tend to move in a forward direction, at one level; they need help, suggestions, and encouragement to utilize and explore the space around themselves.

Note: it is impossible to isolate one factor or aspect of movement from another, as all are in complete relationship; with young children - it is wiser to concentrate on one factor at one time. The floor, the ceiling, and walls can be used to aid direction of movements - to gain an awareness of spacing and pattern. Moving at own speed, mapping individual course as he moves.

During this early exploration of movement, simple percussion sounds, and a well-used voice make an effective and satisfying stimulus. Keep it int[illegible], never start up a great cacaphony of sounds....often the pitch of the sound will indicate a level of space, time too. Combine two clear sounds - a low sound on the gong, with a crash of cymbals....for the development of a pattern.

Weight Factor. This is concerned with an increase of tension which produces strength or force; and a decrease of tension to produce lightness. A complete loss of tension results in heaviness - different from strength. The idea of weight factor can be conveyed by the volume of tone used in percussion: cf. drum - triangle.

Qualities of movement. When the three elements of time, space, and weight are combined - movement qualities are produced.

E.G. a strong, slow movement - in a straight line = pushing/pressing; if same is twisted directionally = wringing movement; if strength is changed to lightness = floating action (light/slow/twisted).

Body Awareness. - should be emphasised continuously; use and stress of various parts of body in relation to total and localized movements. Finding, using, exploring, naming different parts of the body is an essential part of a child's activities: in math - discovering the matching parts of the body: cf. 'odd' parts: finding one's own pulse & heart beat. Children enjoy making their 'own person' from cardboard with paper studs for joints; later these may become skeletons. They are curious about their bodies, and in this way, may form a basis of body-movement-awareness - i.e. the essence of "being alive".

Continuity of movement. Moving is living. Time and motion studies. Specialized movements; reflex movements, mime, pantomime; stereotypes; movements associated with certain roles etc.

Relaxation. Pausing, resting, sleeping....loss of all body tensions; suspension of all the complexity of inter-related activities. To feel utterly limp, to sigh deeply, to find one natural sleeping position.

A movement session should be balanced with relaxation. Departure ideas: - very soft music, touching each child; creeping silently toward the record-player, etc. (No martial marching music etc.).

Effort. This is intangible, - reflected in the action of the body - where it appears fleetingly, but tangibly: perceptions, imagination, awareness, life-force,the inner dynamism of being are reflected. Attention, intention, and decision are stages of inner preparation of an outer bodily action. This comes about when through the flow of movement, effort finds concrete expression.

MOVEMENT AND MUSIC

Music is an abstract expression of movement; movement is not dependent on music. To interpret, music requires translation into effort sequences, expressions, gestures etc. - this is difficult for the young child; a wide variety of sounds, moods, contrasts, - to which the individual is free to react. Flexibility....Happiness... and a satisfaction which will not kill the child's appreciation of music, nor stiffle his natural movements.

Acute Listening brings a more intimate contact with sound. E.G. Sound inspired by the rhythm of external happenings - images in music, - the sea pounding on the rocks in "The Hebrides Overture'; "The flight of the Bumble Bee'; "The Laughing Violin"....etc. If one has the opportunity to select and buy instruments, one should buy band or orchestral instruments - as far as practicable. Make it a growing collection.

Children must have every opportunity for experimenting, exploring, and playing them. Show how sounds can be produced, discuss each piece; discuss sounds and instruments in relation to movement; they should be learningful and enjoyable for the children.

The connection between movement and music does not have a definite character; the movement may arise from the mood of the sounds; or it may follow changes in the dynamic pattern - strong accents or climaxes. Each child will react and move differently - individually. It is often assumed that all children can move easily to music: some only do so with difficulty, some most reluctantly, and some not at all. When working with young children in movement one should not demand too much in terms of their powers of moving and listening simultaneously. Avoid stereotyped steps, gestures etc.

The child should have every opportunity to accompany his own movements with the percussion, be encouraged to play for another child; or lead a group movement with an instrument. A choice of instruments should be provided at each session. Care of instruments - they are seldom damaged during actual playing - accidents most likely occur when they are being packed - make sure all children know how and where they should be placed.

Making instruments* - filling tins with assorted objects - peas, beans, ping-pong balls, ball-bearings etc.; cover attractively. String-instruments - cigar boxes using gut or metal strings. Making bundles of chains. Drums from barrels etc. Bottle tops, cake pans, tin plates & wooden spoons. On completion, the child will desperately need to play and to move with his instrument; opportunity must be given for this.

*"Musical Instrument Recipe Book". (E.S.S.)
McGraw-Hill Co.

TRADITIONAL DANCE: INSTRUMENTS: COSTUMES: MASKS:

Prior to the development of settlement-life, children were continually with their parents and older people, during which time the children learned many of the techniques by imitation and experimentation; - prior to the development of their own unique styles and stories etc. from their own experiences. However, as "the kids are always in school now", the school has an obligation to provide the opportunity, the facilities, and an appropriate instructor for the perpetuation of the fundamentals of dance-ritual and music, peculiar to the local culture. This may be effected by the regular employment of dance/music instructors from the local community, the acquisition of appropriate instruments, the provision of a regular time allotment during the winter; together with the discreet use of tape recorders and video-cameras as local opportunities arise. Local Education Advisory Boards could contribute greatly in this, and the construction of costumes, instruments and masks might well become an integral part of present sewing and technology program.

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PHYSICAL EDUCATION PROGRAM GUIDE

The following programs give practical guidance re. methodology and teaching strategies, illustrate communication in its widest sense, and indicate clearly the inter-relationships, patterns, and language of all areas in the curriculum.

CORE PROGRAM: K-6

"Basic Movement Education for Children", B. Gilliom, Addison-Wesley, 1970.
Alberta Elementary Physical Education Curriculum Guide.

COMPLEMENTARY PROGRAMS: K-6

Gymnastics:

Teaching Gymnastics. E. Mauldon & J. Larson.
(Macdonald & Evans 1965)

Games & Athletics:

"Your Physical Education". Miller, Willgoose & Wylie.
(McGraw-Hill. 1970)

Comprehensive: Skills:

"Physical Education for Life". C.A. Bucher.
(McGraw-Hill 1970)

Dance:

"Creative Dance in the Primary School". J. Russell.
(Macdonald & Evans 1965)

Drama:

"An Introduction to Child Drama". Peter Slade.
(U.L.P. 1956)

Northern Materials:

Northern Games Charts, (Folio of illustrations and text),
Curriculum Division, N,W.T.
Eskimo Games, Curriculum Division, N.W.T.
Northern Survival, Information Canada, Ottawa.

Human Communication (Teacher Reference):

"The Silent Language". T.E. Hall.
"Body Language". Julius Faust.
"Development through Drama". Brian Way. (Longman's 1967).

SCIENCE

Many children may think of science as space travel, as the combination of test tube chemicals, or as the discovery of new and different gadgets. Science is more than these concepts suggest. It is a way of working with facts but not in itself a mastery of facts. It utilizes natural curiosity as a powerful motivating force in the search for meaning and understanding. Children live in a science oriented world and it becomes a responsibility of schools to help them direct their thinking toward the understanding and appreciation of it.

THE SCIENCE TEACHER

As the teacher you are the one who stimulates, guides, listens, questions and inspires. At times you may find it difficult to withhold answers to the questions raised in the text or by the students. You may be tempted to tell a child just how to proceed in order to solve a problem. Yet, by encouraging children to derive their own solutions, using their own data, you will be helping them learn how to go on learning for the rest of their lives.

Science, A Modern Approach
Holt, Rinehart and Winston

.....What is more, science presents the teacher with a constant challenge to learn and discover for himself, a challenge which can only have a beneficial effect upon his teaching.

Nuffield Junior Science
Science Research Associates

....(the science teacher) is in the anxious business of responding to change.

Dialogue, Newsletter No. 5

The Role Of The Science Teacher

1. To select and organize the curriculum as per -

   investigating different curricula projects for new and exciting ideas;

   using what is meaningful for conditions in his classroom;

   finding out what is available in the school and environment and when students might use it.

2. To act as a consultant for the class in terms of:

   manipulating the classroom environment so that children are stimulated into asking relevant questions about the material presented;

   encouraging the children to make their own observations and to rely less on the teacher's verification;

   setting up his own experiments at times and thus teaching by example and encouraging respect for new ideas.

3. To set the stage so that children can fulfill their learning and social needs with respect to:

    helping children to understand the difference between liberty and licence in terms of conduct;

    safety education both within and without the science classroom;

    making available appropriate equipment and materials.

Basic Considerations

A different approach to the science curriculum implies that children, as well as teachers, need time to adjust their thinking. To make a science program function to the best advantage some factors must be recognized.

Motivation - Motivation is not the same as external stimulation but something generated within the child himself. Children have a basic urge to explore and find answers to their own questions and they can carry on the activities with great persistence. They are challenged by ideas that are different from the information they already have. The young experimenter needs fuel for motivation by hearing leading, thinking questions, by seeing a variety of the interesting realities of his environment that invite his exploration, and he needs to feel a warm and encouraging climate developed by interested adult guidance. Children who have not worked in this way primarily need patience and help on the part of the teacher.

Language - For children whose first language is not English the "fine" points of explanation in English can easily be lost. A subject such as science has an appeal of its own and with the emphasis now on a program which is activity-oriented as well as materials-oriented, the young, active discoverers can draw their own conclusions from their own efforts. In this sense, science, as a study, has scope for stimulation of interest and understanding without the necessity of many words. Then when the child feels more at ease with the second language, a subject such as science fosters interest and curiosity which in turn involves the natural use of spoken language.

Method - Any child may have some reluctance in pursuing his own "exploration" if he has been conditioned to passive learning approaches. Moreover, for some children their reluctance "to try things on their own" can be compounded by a hesitancy to ask questions - their cultural background suggests to them that to ask a lot of questions of an adult is unacceptable. For these reasons the teacher should be careful not to equate an initial lack of response with disinterest or even lack of ability on the child's part. The child needs time to develop confidence in his ability to explore and experiment on his own.

Community - The local environment should not be overlooked as a potential "science laboratory." The immediacy of science problems (erosion, pollution, conservation, etc.) can be useful stimulators, and more importantly, can demonstrate the relevancy of science to the settlement and its development. In most settlements there are many excellent resource people who can be invited to participate in the program: game management officers, nursing staff, seismic crews, petroleum engineers, research workers, etc.

Behaviour - Children who have been accustomed to a more structured form of classroom procedure can have major difficulties in coping with the implied freedom of a "discovery" approach to learning. The teacher undoubtedly will have some anxious moments, at least at the outset, in trying to contend with apparent problems caused by over enthusiasm, excessive excitement, etc. However, as children become truly involved with their projects the discipline problems can be expected to disappear.

Text Books - At first glance it may be felt that the text books present some suggestions which are unrelated and impractical in an isolated Northern settlement. However, on closer inspection the teacher will realize that many activities suggested in the materials can be adapted to the local situation and still exemplify the concepts the teacher has in mind. Moreover, many of the suggested activities have universal appeal: magnets, wheels, batteries and electricity, etc. With this in mind the recommended books have been listed in two categories: student and teacher resource items. In each instance the books should be used for "ideas" rather than as prescriptive courses in themselves.

Reading Ability - Research into the reading levels of science text books has generally found the written material to be too difficult for the intended grade level. Three different series of text books have been evaluated by a process using various readability formulae. The conclusion reached indicated that in the hieararchy of involvement of a pupil in the science program, concrete experience is far higher than reading about science. It is therefore appropriate to provide the child with concrete experiences in an area before he is asked to read about the particular phenomenon or concept. (Elements, February, 1971, Department of Education, University of Alberta.)

The Approach - In the recent past as the "Discovery Approach" to science has developed, two philosophies - Process or Concepts have emerged. The first philosophy emphasizes the need for the child to build his own criteria for selection and study, and then to move from a given interest to other endeavours as the need arises. This can be called a Continuum or Process approach. The other philosophy suggests that there are certain concepts which are universal and which can be generalized from particular experiences. This is the Conceptual approach. It is not the intention of this curriculum to recommend one approach over the other since both very definitely emphasize the Inquiry or Discovery approach to learning. The teacher must make his choice as to how he can best achieve a good working situation in his particular setting.

An attempts has been made to list resource books which complement each philosophy. In general, the Nuffield Junior Science and the Elementary Science Study materials follow the "Process" approach. Science for Tomorrow's World, Concepts in Science, and the Experiences in Science materials favour a "Conceptual approach.

Summary - Regardless of the teaching method chosen, the science program should reflect the needs and aspirations of the students and should lead to the development of such skills as:

Observing
Classifying
Predicting
Formulating hypotheses

Quantifying
Communicating
Inferring
Formulating models and experimenting
Defining Terms
Controlling variables
Interpreting data and results

These skills must be employed at the level on which the child can work.

THE PROCESS APPROACH

Nuffield Junior Science

The Nuffield materials outline an approach to science that encourages each child to explore and discover according to his own bent. The suggested techniques are based upon underlying, innate behavioural patterns of children between the ages of five and thirteen. Listed below are some of the needs of the child which the program was designed to fulfill.

1. Children learn by sensory experience. To learn about something a child must feel it, handle it, smell it, or taste it, if that is practical. Motor sensory experience is necessary and satisfying. Children must try out magnets, find what will float or see how a gear works. Films, books, radio, television and verbal explanation can extend but cannot replace sensory appreciation. Children learn through concrete situations and practical enquiry.

2. Each child is unique in himself. Each has his own particular feelings, needs and reactions and the school, in different ways, can compensate for limited experience. A wide range of learning opportunities can be offered and children encouraged to explore them fully.

3. Children must be active and involved in order to understand and appreciate. Basic ideas essential to full understanding of the world are formed through practical experience. As a child explores his immediate surroundings he applies his knowledge to explore further and so his horizon expands.

4. Children need to talk, tell, discuss. Oral vocabulary goes hand in hand with interest and involvement. Any new stimulating experience motivates the use of language, first oral, then written.

5. Children do not learn through passive absorption. Learning is an active process which Jean Piaget termed, "Living Learning". New understanding becomes part of what is already understood and in turn stimulates further enquiry.

Nuffield Materials

Books and reference materials in connection with this science program are listed below. Teachers may not wish to buy all of them but at least one copy of each would be a valuable resource in any school.

The books supply not only suggestions for the implementation of a science program but also actual reference information on a variety of topics. (Canadian distributor: Longman's Canada Ltd.)

Teacher's Guide 1 - $4.40

This book outlines the general educational beliefs and underlying philosophy of the Nuffield approach supported by detailed examples of work done in schools. Chapter three is very helpful to any teacher who is unfamiliar with this way of thinking but who would like to make a start. The book offers detailed discussions about classroom organization, books and learning aids.

Teacher's Guide II - $4.40

This is a source book of information and ideas. It is a collection of illustrations with accompanying descriptions of apparatus designed and made by children and teachers and intended for reference use by other interested learners. The book points out that apparatus should be the adaptation of everyday items because (1) ready-made is often too expensive and (2) it often represents a maturity and sophistication of view that children are not ready for. (3) Each child needs the vital experience of creating for himself the means to solve the problem he has posed for himself. A copy of this book would be valuable in any school.

Animals and Plants - $4.40

"Animals and plants can be first-rate starting points for all kinds of investigation in science, geography, history and mathematics. Children can be encouraged to develop a responsible, sensitive attitude toward other living creatures." This book is about a variety of living things, their habits, their natural history. How to care for them and possible uses for them as teaching material. The book is valuable also in that information such as this is usually widely scattered and difficult to find. Some suggestions in this text are impractical for a cold climate but many could be applied to living creatures and plants found in the north. The process of importing animals to remote schools can be a disaster for small creatures.

Teachers Background Booklets - 80¢ each.

1. Autumn into Winter
2. Science and History
3. Mammals in Classrooms

The three small paperbacks are written to provide teachers with accurate information in layman's terms on topics of interest in classrooms. They include further references, suggest how the information might be developed and give examples of work already done in schools. Everything suggested is not necessarily applicable to the north but, again, a good idea can usually be adapted and made to apply to a variety of situations.

Science Project Experiments - 70¢ each.

Electricity
Machines
Light
Air and Weather
Weather, Water and Soil
Sound, Heat and Structures

This is a series of six paperback activity booklets designed to supplement the Nuffield Junior Science Project. Each book is thirty-two pages in length and on each page are suggestions for an open-ended experiment which students can perform on their own with inexpensive and readily available materials. The Apparatus book is used in conjunction with these booklets. Any teacher of children beyond primary grades would enjoy having these books in his classroom.

Junior Science Source Book - $5.95

This book takes many "starting points" that could be familiar to any school and suggests numbers of enquiries which could be pursued by the pupils. As teachers often find it difficult to anticipate lines of development in the children's enquiry, the authors have included much information on the subjects dealt with.

Although the experiments are not always suitable for the north, there are very few that cannot be adapted in whole or in part to suit the interests of northern children and the practicalities of northern schools. A copy of this book would be valuable reference in any school.

Nuffield Combined Science - listed in the Longman's catalogue.

This set of books is about at a Junior High level.

For teachers - Teacher's Guide 1 $11.00
Teacher's Guide 2 $10.00
Teacher's Guide 3 $ 7.00

The first two guides contain a comprehensive set of instructions on how to set up the experiments listed in Activities, the student's books. The third guidebook is a laboratory handbook with an appendix on teaching maths in relation to Combined Science. The three books contain a detailed list of materials needed.

For Students - Activities, package I (books 1-5) $5.75
Activities, package II (books 6-10) $5.75

Each pack includes five booklets for from thirty to sixty pages and each booklet contains a variety of illustrations, diagrams and questions. The course is described as a method of introducing children in the age range of eleven to thirteen to natural phenomena and ways of interpreting them. Combined Science depends on a relationship between teacher and children which they experiment and speculate as a team. Involvement, flexibility and understanding are the guidelines.

Elementary Science Study Unit Booklets (E.S.S.)

Teacher's Manuals

McGraw-Hill of Canada,
330 Progress Avenue,
Scarborough, Ontario.

Topic	Interest-Level	Cost
Growing Seeds	K-3	$2.25
Life of Beans & Peas	K-3	2.22
Primary Balancing	K-3	4.77
Light and Shadows	K-4	2.22
Brine Shrimp	K-4	2.22
Pattern Blocks	K-5	2.40
Geo Blocks	K-7	2.22
Tangrams	K-8	1.50
Attribute Games & Problems	K-9	3.84
Eggs and Tadpoles	K-9	2.22
Changes	1-4	2.25
Mirror Cards	1-7	2.82
Mobiles	2-3	1.86
Clay Boats	2-6	3.48

Mystery Powders	3-4	1.86
Ice Cubes	3-5	3.48
Rocks and Charts	3-6	2.22
Where is the Moon	3-7	3.96
Peas and Particles	3-8	2.97
Coloured Solutions	3-8	2.82
Bones	4-6	4.06
Batteries and Bulbs	4-6	4.29
Pond Water	4-6	2.58
Pendulums	4-6	2.82
Small Things	4-6	3.90
Animal Activity	4-6	2.22
Microgardening	4-7	4.77
Behaviour of Mealworms	4-8	3.30
Kitchen Physics	5-8	3.30
Gases and "Airs"	5-8	3.90
Crayfish	6-8	2.22

THE CONCEPTUAL APPROACH

The concepts outlined in Science for Tomorrow's World and in Concepts in Science, have been combined and certain ones emphasized for the purpose of a northern science curriculum. On the following pages these concepts have been listed along with the text chapters which supplement that particular concept. Some of the text chapters contribute to more than one concept and in that case are listed under the predominant one. These have been arranged this way for convenience and easy reference. Many excellent suggestions are incorporated in the texts and teacher's manuals and with very little change of emphasis can become applicable to specific northern situations.

Key Concepts And Related Chapters

1. Events in the natural environment are orderly rather than haphazard; man searches for laws to explain the order by observing, hypothesizing, checking his ideas and accepting only those that fit with reality.

Book 1	2	3	4	5	6
Science for Tomorrow's World					
The Weather Changes p. 1-25		Our Planet Earth p. 60-69	Weather in Your Life p. 222-259 Light & Sight p. 199-221	Probing the Atmosphere p. 210-261	Objects in Motion, p. 62-95 The Nature of Light p. 192-232

Concepts in Science

Hot & Cold p. 29-38 Cloudy & Sunny p. 39-48	Silence & Sound p. 40-57 Darkness & Light p. 58-77	The Forms of Things p. 109-152	The Travels of a Drop of Water p. 60-97		

2. There is a basic tendency toward stability in the universe; thus when energy or matter change from one form to another the total amount of the energy or matter remains unchanged.

Book 1	2	3	4	5	6
Science for Tomorrows World					
Pushes & Pulleys p. 44-61	Finding Out About Forces p. 32-59	Food for Life p. 192-226	Understanding Energy p. 21-55 Sound-A Form of Energy p. 170-175	The World of Chemistry p. 166-209	Electricity & Electronics p. 96-141
Concepts in Science					
Making Things Move Moving Faster Up & Down p. 1-28	Fuel at Work p. 26-39	Energy at Work p. 31-72	The Bounce of Sound p. 2-27 The Bounce of Light p. 28-59		Machines in Action p. 153-193 Electrons in Action p. 231-284 Matter into Energy p. 285-323

3. Scientists have developed measures of space, time and matter so that they can explain and predict events in the environment.

Book 1	2	3	4	5	6
Science for Tomorrow's World					
	The Scientist's Way - Finding Out p. 1-31	The Scientists Way - Being Curious p. 1-27	The Scientist's Way - Comparing Things p. 1-19	The Scientist's Way-Testing	The Scientist's Way-Measuring Things

				ideas, p. 1-21	p. 1-35 Science, Today & Tomorrow p. 342-387

Concepts in Science - none

4. All particles of matter are constantly in motion and this motion of particles helps to explain phenomena such as heat, light, electricity, magnetism, and chemical change.

Book 1	2	3	4	5	6
Science for Tomorrow's World					
Seeing & Hearing p. 82-97	Finding out About Heat p. 108-145		Using Electricity p. 138-169	Cells, Tissues & Organisms p. 22-43	Heat and Molecules p. 36-61
Concepts in Science					
	The Very Small p. 2-15 Molecules at Work p. 16-25	Energy from the Sun p. 1-30	The Travels of Some Molecules p. 98-133	About 100 Building Blocks p. 22-43	Molecules in Action p. 195-229

5. Living things are in constant change.

Book 1	2	3	4	5	6
Science for Tomorrow's World					
Keeping well p. 26-43	Finding Out Plants p. 82-107		Living Things Green Plants p. 56-99		
Concepts in Science					
Living Things Grow We Grow Long, Long Ago Changes We See p. 95-152	We Grow & Change p. 120-125 Millions of Years Ago p. 150-165	In water & on Land p. 245-286	The Travels of a Handful of Soil p. 218-253	Stories in the Earth p.	

6. There is a relationship between structure and function; living things are determined by heredity and environment.

Book 1	2	3	4	5	6
Science for Tomorrow's World					
Growing up p. 62-81	Finding Out How Your Body Moves p. 60-81 Finding Out About Feelings p. 146-163	Your Body's Needs p. 152-191	Safety and Science p. 260-315	Systems of the Body p. 76-121 Conquering Disease p. 122-165	How Animals Behave p. 298-341
Concepts in Science					
	Plants Live & Grow p. 78-97 Stories for a New View-The Earth's Plants p. 166-185	Kinds of Living Things-Animals p. 183-212 Kinds of Living Things-Plants p. 213-244 Roll Call of Animals p. 287-308		Building Blocks of Living Things p. 144-189 Building Blocks of the Body p. 190-225	Code of Heredity p. 325 363

7. Living things are interdependent with one another and with their environment.

Book 1	2	3	4	5	6
Science for Tomorrow's World					
Animals p. 98-118		How Animals Live p. 100-151	Animals-Simple & Complex p. 100-137	Growth & Development p. 44-75	Life on the Earth p. 234-297
Concepts in Science					
Plants & More plants Animals & More Animals p. 61-94	Animals Live & Grow p. 98-119	Treasures in the Earth p. 153-182	The Journeys of Salmon & a Duck p. 174-217 The Fall of a Tree p. 134-173	Green Cells as Building Blocks p. 226-269 The Earth Inside & Out p. 2-49	Learned and Unlearned Behaviour p. 3-45

8. The universe is in constant change.

	Book 1	2	3	4	5	6
Science for Tomorrow's World			The Sky Above p. 28-59		Probing Outer Space p. 262-309 Probing the Oceans p. 310-350	Astronomy p. 142-191
Concepts in Science	Light & Dark p. 49-60	The Very Small p. 126-149	Beyond the Earth p. 73-108	The Voyage of Halley's Comet p. 254-284	The Earth in Orbit p. 90-143 Building Blocks of the Stars p. 270-303	Stars and Starlight p. 365-402

Experiences In Science (E.I.S.)

Teacher's Manuals

Mc-Graw-Hill of Canada
330 Progress Avenue
Scarborough, Ontario

Grade 1 Level, $1.44 each.

Hot and Cold
Young Animals
Light and Shadow
Earth and Sun
Weather
Plants in Spring

Grade 2 Level, $1.44 each.

Magnets
Batteries
Groups
Balances
Air
Living Things

Grade 3 Level, $1.62 each.

Motion
Earth, Sun & Seasons
Heat
Sound
Life Histories
Plant & Animal Responses

Grade 4 Level, $1.62 each

Solids, Liquids & Gases
Chemical Change

Adaptations
Atmosphere & Weather
Geologic Processes
Ecology

Grade 5 Level, $1.80 each

Microscopic Life
Molds
Unbalanced Forces
Balanced Forces
Mapping
Time

Grade 6 Level, $1.80 each

Electricity
Life Processes of Plants
Light
Colour
The Universe
Continuity of Life

THE COMMUNITY LABORATORY

The use of the community as a resource for the teaching and learning of science is as important as any text or visual aid. The local community should not, be used as a curriculum in itself but rather shown as a small part of a wider world community. If a child understands the basic concepts exemplified in his own surroundings he can more easily develop a sound perspective toward the fundamental natural and social forces of the universe.

Each child needs:

...the opportunity to investigate everything that comes to hand supplemented by interested attention from teachers and other adults so that he may interpret and develop what he finds.

...direction in order to develop a consciousness of, and an enquiring attitude toward, the phenomena evident in his world.

...guidance in drawing conclusions not only on how to improve a situation but also on what caused the problem in the first place.

...encouragement to develop a feeling of responsibility toward his surroundings and an understanding of his own place in relationship to them.

Field Trips

Field trips are fascinating and essential to children and adults alike. Many things can be learned firsthand about the natural surroundings and their relationship to other living things. Field trips can be planned to take advantage of some seasonal feature such as the migration of birds, the blooming of certain wild flowers or fish spawning in a river. Many worthwhile benefits of field trips include: (1) the satisfaction of seeing the interdependence of living things and the predictable events in the recurring cycle of the seasons; (2) a deeper respect for living things and good outdoor manners; (3) a sound basis for starting a life-long interest in the out-of-doors and (4) a regard for the value and necessity of conservation.

Topics For Community Exploration

The topics listed on the following pages are suggestions for possible investigation by the children within the scope of their own communities. Each topic has infinite possibilities for development as interest and understanding expands.

Each topic has a connection with the "general concepts" outlined for the science program. The material is not a prescribed list of subject matter to be taught in the process of a year's work but merely a list of suggestions for applying the conceptual ideas in the context of the community. It is hoped that, with the help and guidance of the texts applied to the practical tangibility of the community, northern children will benefit from a science program that could influence their enjoyment and understanding of the world about them.

Topics for the 6 to 8 Year Old Child

Senses.

A young child investigates the world mainly through his senses - how things feel, small, taste and how much can be discovered by sound and sight is invaluable to his learning. Practical experience involving exploration through sensory means cannot be replaced, With this in mind many experiments can be carried out involving sensory responses. e.g. Sound - to hear, to make, how it travels. The causes of sound - moving objects, waves on shore, wind in trees, etc.

Water

This is a continually interesting topic for young children and they need plenty of opportunity to experiment with it - not only the specific qualities of water but also its effect on different things - its power to dissolve certain materials - its importance to life, animals, plants and people - change of forms of water - evaporation, ice - influence by erosion - experiments with a sponge,floating objects, capillary action. Children should know where the water in his community comes from, (river, lake, well) and how it is handled.

Animals

Children should develop an awareness of the many kinds of animals and an understanding of their place in the world. Interest can start with animals children see in their own area - including birds, insects, reptiles - their habits, their personalities, their influence on people. Young animals and their needs - how animals are adapted for survival - some young need care, others don't - adaptability of animals to their habitat - the purpose of various species.

The Homes of Animals

Homes on the land, near water, in the ground - the purpose of homes, for shelter, for protection, for safety of young - some have no home, e.g. caribou - homes of insects, spider's web - water animals, fish, reptiles - how living creatures adapt to surroundings for survival. Children should have a chance to examine any fish, insect reptile, bird or animal of the vicinity wherever possible - pictures of animals from other places. A terrarium and an acquarium are excellent when feasible.

People

The importance of people to the scheme of things - sleep and rest, watch puppy or baby - living things grow and change - measure children's growth.

puppy's growth, plants growth - people's feelings - children suggest and discuss situations applying to feelings and emotions. Experiments on special skills of fingers, arms. People as well as other living things adapt to their environment.

The Seasons

Summer, autumn, winter, spring as they come - how they influence the habits of people, animals, birds, insects - investigation of seeds, plants grow from them, people and animals eat them, how they travel, different types, how they survive the winter. Changes of weather as it applies from day to day in a local situation and as it applies in a broader sense to seasonal changes over greater areas. Wind and its influence, its help, its hindrance. Records of daily weather - importance in the north to planes, hunters, animals, people. The difference in day and night during different seasons.

Machines and Energy

The value and use of wheels - machines move in different ways - plane, skidoo, bombardier, boat. The understanding of energy through machines - mechanical advantage in the use of pulleys, of a ramp and of a lever - their common uses. The use of magnets, how they repel and attract - many kinds of magnets, possible uses. Static electricity - Energy to move things, dogs and sleds, tow truck, skidoo, front-end loader, crane, oars, paddle, wind. Living things use fins, wings, feet to move. Children learn the concept of predicting outcomes based on scientific knowledge.

Heat and Cold

Changes caused by heat and cold - expansion of metal - expansion of ice - condensation of warm on cold - heat changes some things - cold changes some things - thermometers and their uses.

Environment

Air - its importance, its qualities, how it moves things, its presence. The influence of air on living things - how it can be used as a force. Living things depend upon air for life. How trees and plants influence the environment. How animals, birds and all living things influence environment. The idea of balance and conservation in nature making a satisfactory whole.

Rocks and Soil

Children can examine soil with a magnifying glass for living creatures - find why gardens do not grow well in some places - experiment with plastic greenhouses to see if soil is responsible - ice moves soil away from some areas - how soil blows - some soils need moisture - understand the possibilities of soil in other places of the world. Children can appreciate the value of soil, the home of many living things, protect seeds, interrelation of plants and soil, - erosion as the result of wind and water. The rocks of different areas - different qualities - different purposes, used for carving in some places.

The Sky

The night and day changes - the moon - space research, northern lights, stars - observation of changes. The sun and its importance - its power and influence

- heat, light and life-giving qualities to all living things. Clouds and their influence on the sky's appearance. Children develop the idea of space and distance and of the earth as a part of the solar system. Colours - how light from a sunbeam can be divided into colours - the difference between moonlight and sunlight.

The Earth

The size and roundness of the earth - the land and oceans are part of it - the air and clouds are part of it - gravity - half of the earth always in shadow, half in sunlight. How the earth rotates and revolves about the sun. The idea of great variety on the earth; of topography, of climate, of plant life, of animal life. A globe as a kind of map - the use of maps.

Topics for the Nine to Twelve Year Old Child

Force and Energy

A change of any kind involves energy. Energy is everywhere. It has many forms: chemical, muscular, electrical, mechanical as well as light, sound and heat. Everything is made of particles called atoms - electrical energy is movement of electrons. Energy of wind power is used, too. Light energy comes mainly from the sun, sunlight is made up of different colours of light. Examples of different forms of energy can be demonstrated in most communities. Light energy turns to heat energy. Heat causes changes, expansion, contraction - molecules and their action - convection currents. Social significance of sound - communication made possible by sound - e.g. speech on telephone, radio, television, from one person to another - caused by vibrating objects - sound travels through gases, liquids and solids - it travels in all directions from its source.

Chemicals

The earth and things on it are made of chemicals - only comparatively few basic ones, elements, which make up all chemicals. Chemicals combine to make new substances - heat and light cause chemical changes. Chemical mixtures can be taken apart.

The Seasons

Why the seasons change, the broader view. Continual change of living things. Distance from equator affects the world's seasons - angle of the sun's rays affects temperature. Half of earth always to the sun. Certain predictions can be made regarding seasons and weather. Weather can be forecast, through changeable - thermometer, barometer, air temperature, air pressure - weather station - clouds. Value of information about the weather. Significance of north pole and north star. Animals and people are influenced by seasons. Migration of birds and animals - hibernation - fur and feather protection - insects change their forms. Plants adapt to season and climate.

Animals

Interrelationship of living things - people depend upon the general well-being of animals, plants and environment. Many groups of animals, mammals, birds, amphibians, fish, reptiles and insects - vertebrates and invertebrates. The value of animal life in the community which includes mammals, birds, reptiles, fish, insects. All change as they grow - specific changes in certain creatures - different ways of reproduction. Living creatures survive from year to year because they adapt to changes that occur. Some animals live in communities - advantages and disadvantages in this. Some common insects lead complex social lives - bees, ants. The interrelated activities of people, animals and birds are particularly significant in northern living.

The Earth

Its size, shape, motion and how this affects people. Geysers, hot-springs, volcanoes, earthquakes indicate the inside of the earth.

Air and its necessity to life - its qualities. Interrelationship of earth and sun - earth and life on it. Rocks worn away by wind and weather to make soil - wind and weather moves soil from place to place. The oceans and oceanography.

The Earth's Resources

Rocks and minerals used in many ways - indicate life on earth at an earlier date. Different resources supplied by the earth and the uses they are put to - gold, silver, oil, gas - uranium for atomic energy. Water as another source of rich resources, whales, char, crabs, seaweed from the oceans of the world. Three-quarters of earth covered with water, some salty, some fresh - the tides. Contour of ocean floor resembles earth with hills, mountains, plains. Possibility of great plant, animal and mineral resources for each part of surroundings contributes to a satisfactory whole - life in the world depends on natural resources. Children learn how these resources came there and how they influence the community. A resource may also be people, rocks for carving or water for transportation.

People

The only living things that think and plan - people can look ahead and accomplish things - can live and work together for individual good and for general good-people change as they grow. People can plan for protection of plants, animals and of themselves. Different races of people all have ways of adapting to different parts of the world - individual differences are interesting and acceptable.

People are responsible for industries in the north - a co-op, a sawmill, handicrafts come from their needs, interests and capabilities.

Electricity

Chemical energy into electrical energy – need of a complete circuit - static electricity, different from magnetism - generated electricity - experiments with dry cell batteries - insulation - conductors - electromagnets - lightning - thunder caused by expansion of heated air. Electricity produces heat and light - electricity can send messages.

The Sky and Universe

The enormity of the universe becomes evident as the child's world and understanding develops. The universe, earth, starts, all very old - constantly changing. Information and speculation on space travel and discovery. The moon and its qualities - nearest the earth, smaller, reflects sun's light - doesn't change in size or shape. Planets, moon, earth revolve about the sun - telescope needed for studying the sky. The Milky Way and other star patterns - explanation of Northern Lights. The sun - how people, animals and plants depend upon it - implications in the North - as a source of energy - its good, its harm - gravity. Children like to speculate on the laws of the universe and much discussion can arise regarding movement of earth, sun and moon.

The Environment

Plants adapt to season and climate - to soil and moisture condition - plants are protected by certain qualities in order to continue existence, e.g. Arctic Willow. Environment changes over a few years - over hundreds of years, fossils. People must use soil, forests, and other resources wisely.

Soil

Plants, animals and people depend upon the soil. Soil can be carried away by wind and water - plants can hold soil in place - soil contains minerals. Soil is replenished by vegetable matter Some parts of the world have good soil - children can text their own. Things used that depend upon soil - fruit, vegetables, etc. Could plants grow well in certain communities? Would it matter if there was no soil in certain communities.

BUILDING A TERRARIUM

A terrarium provides a suitable place in a busy classroom where insects or small animals can be kept for a short time to be studied by children then allowed to go their way. In a terrarium children could see such things as the life cycle of a moth or the breaking of a spider's egg-sac. They could see adaptations and interrelationships existing among living things. Conservation of moisture, protection against sudden changes of temperature and provision for light are the basic principles of a terrarium. Many children become so interested in its possibilities that they find ways of making one at home.

Containers

Terrariums may vary in size from a small jar containing small ferns or bits of moss to a three or four foot container in which larger plants or animals could live. An empty aquarium tank makes a good terrarium. They are easy to plant and care for, they provide sufficient air space and they permit a good view of the inhabitants. Simple, inexpensive containers may be made in a classroom by using panes or ordinary window glass taped together to form a glass box. A stronger variety has the sides taped together and set in mixed plaster-of-Paris in a cookie pan. A large coffee or pickle jar turned on its side makes a good terrarium. To keep the jar from rolling it needs a frame to hold it or a base of plaster-of-Paris.

Planting the Garden

Be sure the container is clean. The garden bed should be established with care. First, place clean gravel or bits of broken flower pot on the bottom and cover with about an inch of sand for drainage. A thin layer of charcoal should then be spread to keep the moist soil sweet. Cover this with one or two inches of sandy soil, sifted and dampened. Spread leaf mold on top if you have it and a few well-placed rocks for cliffs and ledges. Local moss or plants should be used with the local soil and rocks for the good of the creatures who may live there. Lichens and fungi add colour and contrast but should be placed on ledges and watched for mold.

Care of the Terrarium

After the garden is planted water it well but do not saturate then cover with glass to prevent evaporation and to keep the temperature even. The cover should allow for circulation of air. A terrarium is best kept in a cool place in good light but not direct sunlight. Keep the glass clean and if much condensation appears on the glass in the morning leave the lid off for an hour or two. It will likely need a thorough spraying about once a month.

TEACHER REFERENCE MATERIALS

Teachers, Children and Things: Materials Centred Science, C.J. Anastasiou, Holt, Rinehart and Winston, 1971, (2.50)

This paperback has many practical suggestions for implementing a science program including good reference materials and teaching ideas. Essentially it outlines the philosophy and possibilities for teachers and children in a modern science program.

Elementary Science and Mathematics Catalogue, Setsco Ltd.

1315 West 71 Avenue, Vancouver, B.C.

A good source from which to order science materials and equipment, as the items listed are those required in both the Elementary Science Study and the Experiences in Science programs.

Unesco Source Book: Educational Productions, Wakefield, Yorkshire, (Canadian source; Information Canada, Ottawa, 3.50)

Many suggestions on the teaching of general science, how to make some pieces of equipment, and discussion on different topics such as air pressure, magnets, etc. make this a valuable reference book.

CHILDREN AND TEACHERS

Golden Nature Books: Moyer Division Villas Industries, Ltd., Montreal, Winnipeg and Edmonton. (1.35 each.)

- Birds
- Insects
- Stars
- Trees
- Fish
- Mammals
- Reptiles and Amphibians
- Seashores
- Flowers
- Weather
- Rocks and Minerals

	The following titles are 1.95 each: Birds to Know Trees to Know Wild Flowers to Know
Investigating Science With Children	Moyer Division Villas Industires, Ltd. Montreal, Winnipeg and Edmonton, (2.95 each). Living Things - plants and animals, their characteristics, needs and responses to the environment. The Earth - water system composition, the atmospheric process of change. Atoms and Molecules - properties of matter, elements and compounds, size, arrangement and energy of atoms and molecules. Motion - mass, force, acceleration, inertia, momentum, action-reaction, friction, centripetal force, distance, speed and velocity. Energy in Waves - conservation of energy principle, wave forms, sound, magnetism, electricity, electromagnetism, heat, light, photosynthesis. Space - direction, method of measuring, earth's position, observation, exploration, problems.
The Living World Series	McClelland and Stewart, Toronto, Ont., (5.95) Sample titles: The World of the Beaver The World of the Wolf
Basic Science Education Series	Fitzhenry and Whiteside, Don Mills, Ont., (2.00 each approx.). Sample titles: Animal Travels How Animals Get Food Animals Live together The insect Parade.
Canadian Mammals	Information Canada, Ottawa, Ontario. (1.00) A pamphlet containing excellent and concise material on the wild animals of Canada, (illustrated).
Large Yellow Book	R. Fyfe and M. Bryant, Department of Indian Affairs and Northern Development, Ottawa, 1965.

(Now out of print but there should be one in each school.) Subject matter included Arctic Char, Mountain Avens, Northern Raven, Ringed Seal, Willow Ptramigan, Arctic Fox, etc.

Audubon Nature Encyclopedia, Curtis Publishing, Toronto, (50.00)

Canadian Wildlife Service Publications, Information Department, Canadian Wildlife Service, 400 Laurier Avenue, W., Ottawa.

ODDS AND ENDS

Listed below are some bits of equipment and scraps of material useful in a science program. Many more can be added to the list in individual schools. Some system of organization and storage will have to be developed by the teacher.

Equipment

- Compass
- Magnets of different kinds and sizes
- Small batteries
- Candles
- Magnifying glasses
- Spring scale
- Glass tubing
- A few balloons
- Tape measure
- Glass marbles
- Simple mechanic set
- Paper clamps
- Paper clips
- Yardstick
- Foot rulers
- Tuning fork
- Small mirrors
- Several plastic pails
- Wire clippers
- Child's kaleidescope
- Several funnels
- Plastic glass (clear)
- Hammer with claw
- 6" 3-square file (2nd cut)
- 6" flat file (2nd cut)
- Pliers (medium)
- Thermometers
- Iron filings

Scrap Material

- String (fine & coarse)
- Pill boxed (for weights)
- Egg Cartons
- Popsicle sticks (markers)
- Plastic bags of different sizes
- Shoe boxes
- Plastic cartons
- Thread spools
- Clothes pegs
- Wire (snare)
- Balsa wood bits
- Corks
- Jars with screw lids
- Tin cans of different sizes
- Plastic sheets (vapour barrier)
- Nuts & bolts of different kinds
- Nails of different sizes
- Cup hooks
- Cheesecloth
- Boxes of different kinds
- Wire netting for a cage
- Nylon net for dipping
- Stick with can on end for dipping
- Elastic bands
- Some pencils
- Paper cups
- Piece of chicken wire
- Aluminum foil

Spools of copper wire
(gauge +22 and +28)
Weighing scales
Light bulbs (flashlight size)
1½ volts, 3 volts, 6 volts
Alligator clips
A saw
Single pulley
Double pulley
Several pyrex pans
Prism
Screwdriver
Scissors
Egg timer
Broom
Dustpan
Paint Brushes

Seeds

Toothpicks
Funnels

Sponges
glue
Steel wool
Plasticine
Paper plates
Plastic spoons
Screws
Styrofoam bits
Cotton cloth

SOCIAL STUDIES

The Social Studies Curriculum is based on the general framework of the new Alberta Social Studies Program. In this respect, the Curriculum Division of the Territorial Department of Education wishes to acknowledge its indebtedness to the Alberta Curriculum authorities and to the members of the Elementary Social Studies Curriculum Committee under the chairmanship of Mr. C.D. Ledgerwood.

The program as outlined herein does depart from the Alberta program in several instances in order to make the social studies program relevant to the needs and interests of Northern students. However, it must be noted that the effective implementation and utilization of this curriculum requires the use and guidance of the material contained in "Experience in Decision Making", Elementary Social Studies Handbook for the Province of Alberta.

Requests for the Alberta Handbook should be directed to:

Chief of Curriculum,
Department of Education,
Yellowknife, N.W.T.

"WHO AM I"?

Here is a list of some things to consider in planning your Social Studies program. The list is not comprehensive. There are, unquestionably, many other variables to be taken into consideration. However, what follows may at least illustrate that the Social Studies curriculum has a fundamental role to play in the over all aims and objectives of the learning program.

PEOPLE Basically, this curriculum is all about people. This may sound trite. Therefore, let us examine this people "concern" a little more closely. The Northwest Territories is composed of approximately 33,000 people who are, in turn, a part of the larger Canadian society of over 20,000,000 people. In other words, the Northern population is but a 'drop in the bucket" when compared with the total Canadian population. Moreover, the people of the North are thinly scattered - roughly 60 settlements dotted over one third of the total Canadian land mass. The significance of all of this lies in the fact that given a relatively minute population which lives in an immense geographic area it is sometimes possible to overlook the unique characteristics and needs of the people and to think primarily in terms of the mass population of 20,000,000. (As a point of comparison one need only think in terms of the North American continent in total. The 220,000,000 American people tend to dwarf the Canadian population to the point where concern for the Canadian identity is increasingly a topic of wide spread discussion and debate.) In a general educational sense the search for identity as a resident of the Northwest Territories, as a Canadian citizen; and as a member of the "global village" is a prime consideration in developing the learning experiences of the child.

PLURALITY The Northern population is heterogeneous being composed of four major cultural groups.

These are: the Eskimo peoples
the Athapaskan peoples
the Euro-Canadian peoples
the Metis peoples

It is perhaps interesting to note that in the Eskimo language, as in the Athapaskan languages, are to be found terms that indicate the "self concept" of the peoples. In both instances the Eskimo and Athapaskan populations referred to themselves as simply "the people". In Eskimo the term employed is "Inuit." In Athapaskan languages the terms may be "dene" or "done". In essence, these terms convey the "world view" of the Northern residents prior to the arrival of Euro-Canadian population. Moreover, within the Athapaskan and Eskimo populations there are important sub-groups, each of which possesses its own unique linguistic and cultural characteristics. For example, there are Slavey, Dogrib, Loucheux, Hareskin, and Cree Athapaskan peoples. There are also Netsilik, Igloolik, Aivilik, and Back River Eskimo peoples. (In a like manner one may sub-divide the Euro-Canadian population into the English, French, Italian, Ukranian, German, etc. sub-groups.) The diversity of "people" characteristics can, in turn, be related to the larger Canadian setting. The conventional phraseology, "Canadian Mosaic", possibly provides the best "mental image" which underscores the need to recognize that Canadians are representative of a multiplicity of cultures, languages, historical backgrounds; each unique in his own way and each contributing to the Larger Canadian Dimension.

REALITIES

Recognizing the heterogeneity, the pluralism, the diversity of the Northern social context constitutes an important first step. But it would be superficial at best, and, at worst, erroneous if the educator was to assume that recognition of the "mosaic" was all that was required. The vital second step is to become aware, to develop a social consciousness in terms of the REALITIES of Northern living. By becoming socially aware the educator may be in a better position to come to grips with the immensity and complexity of the educational job that needs to be done. Consider the following: -

- economically, the life of Northern peoples is controlled by the minority Euro-Canadian population;
- politically, the major decision-making power has been the almost exclusive perrogative of the minority Euro-Canadian population. Only very recently, with the growth of organizations such as the Indian Brotherhood, Committee of Original Peoples Entitlement, Inuit Tapirisat, and the Metis society have the voices of the non Euro-Canadian populace begun to be heard - and heeded. Furthermore, with the growth of

local government the involvement of Northern peoples in the political process is beginning to occur in a practical manner;

- statistically, if you are born into a non Euro-Canadian family the chances are that you will live a life of poverty;
- statistically, infant mortality rates are higher, and life expectancy lower if you happen to be Athapaskan or Eskimo rather than Euro-Canadian;
- the mass media (radio, television, 16 m.m. films, recordings, printed material) exemplify, if not extol, a way of life foreign to the majority of Northern residents - the Athapaskan and Eskimo peoples;
- essentially, an urbanized life style, as this is typified by settlement living, is an experience of relatively short historic duration for many Northern peoples;
- compounding adjustment problems in terms of settlement living are attendant social problems;
- stable, wage earning opportunities are relatively limited; most well paying jobs are held by Euro-Canadians;
- conflicting patterns of attitudes and values are readily apparent; broadly speaking the conflicts can be categorized as: those that divide the Euro-Canadian from the non Euro-Canadian; those that divide the older from the younger generation in any given cultural group (the so-called generation gap among non Euro-Canadian peoples can be more pronounced given the rapidity of social change over the last decade);
- the "welfare state" is a fact of life for much of the Northern population in the sense that it provides the one source of steady income upon which people may rely - in this respect, the impact of the "welfare state" on shifting patterns of attitudes and values can be profound.

Without elaborating in further detail the foregoing information should be sufficient to indicate just how important it is for the teacher to become socially aware, even if this is possible only to a limited degree. The question now is, "but how does all of this information relate to the social studies curriculum"? The answer may be found by directing our attention to the child.

THE CHILD

In planning your program for your students there are at least 6 important variables to keep uppermost in your mind. These are:

- developing feelings of self esteem, self worth in the mind of the individual child;
- providing reinforcement and subsequent extension of the individual's pride in his cultural heritage;
- providing cultural models with which the child can identify;
- making provision for learning opportunities that will help to eliminate sources of cultural conflict;
- providing opportunities for the child to learn about the

importance of "man living with man" - the concept of the interdependence of the human family.

- making it possible for the individual to become increasingly adaptable to social change: its rapidity, and its consequences.

It may be unecessary to add that no where in the above information is any mention made of the need for the child to acquire mastery over a body of content information. This ommission is deliberate. The focus of the curriculum is upon the attitudes and values of people in the first instance, and the necessary learning skills which will enable the individual to develop and refine his own attitudes and values in the second instance. The acquisition of content information on the part of the child is regarded as being of incidental importance.

The Six Variables: An Elaboration

Self Esteem: Every child must be given the chance to find his answers to the basic questions, "Who am I, How do I fit in, What is my part to play in a pluralistic society"?For the non middle class child, regardless of his ethnic origin, the emphasis to be placed on providing opportunities to find answers to these questions is doubly important. Obviously, the answers are not found easily. Rather, the "answering process" is cummulative. For example, gradually over a period of years the student becomes aware of his Loucheux heritage, his relationship to the Athapaskan "family", his citizenship within the Canadian Mosaic, and his membership in the global community. Finding answers in this respect can be likened to the "unfolding of the petals of a flower." From the central focal point of "I as an individual" slowly an unfolding process takes place as "I" becomes increasingly aware of what is immediate to "me" and eventually "my" awareness grows to encompass the larger whole. The essence of this approach is on expanding the individuals horizons. With respect to the non middle class child the educational system can lose sight of the need to make it possible for him, as much as for any individual, to come to know himself and his heritage first before making the mental leap to the dominant social context.

Cultural Reinforcement: This concept is closely related to the above. It can be thought of in this manner. The school setting is commonly a reflection of the attitudes and values of the middle class society. Its orientation in terms of time, routine, work habits, success and/or failure, materialism are all components of the middle class way of life. If the pupil happens to have been raised in a middle class home environment it is reasonably clear that this adjustment to the school will be minimal, particularly when contrasted with the adjustment that has to be made by the non middle class child. In the former instance the school reinforces the values and attitudes that have been developed in the home. In the latter instance the traditional approach has been to expect the child to "adjust". Unfortunately, this is more easily said than done. An individual does not supress, if not displace, his environmental conditioning quite so simply. Nor should he be expected so. It is the "system" not the individual which must change. The school must make it possible to reinforce the cultural attributes of all of its pupils. Once again the learning program must try to capitalize upon the strengths of each child and in this instance this means reinforcing and then building upon the cultural "strong points" of every child.

Cultural Models: Think of this variable in the sense of a child asking himself questions such as these; "Who would I like to be like, What would I like to be when I grow up, Who do I admire, etc."? Then as a teacher, ask yourself such questions as "Does my classroom environment provide "models" with which the children can identify readily, Are there culturally relevant "models" with whom they can identify?" The point is that a non Euro-Canadian child may be virtually swamped with identification models that bear no relation to the child's ethnic group. For this reason the teacher should try to provide children with "models" that do mean something to them. For example, pictures and information about past and present Metis, Indian and Eskimo leaders, artists, athletes, professional people, etc. would help the respective children to come to appreciate the contributions that have been made, and are being made by their own people, and perhaps more importantly, such "models" would help to establish the confidence of the individual with respect to his concept of himself and his capabilities. In terms of vicarious experiences students should, where possible, have the opportunity to meet and talk with college students, politicians, artists, etc. Such first hand experience is reinforcement in itself and moreover, a valuable motivational factor.

Cultural Conflict: The cummulative effects of emphasis on the first three variables will help to reduce this conflict. However, there is an important misconception to be considered. Sometimes the assumption is made that "if only the Athapaskan, Metis and Eskimo peoples could come to understand the Euro-Canadians then problems, real or imagined, will disappear." Cultural understanding is a two way proposition. It is just as important for the Euro-Canadian child to grow in his understanding and acceptance, as it is for the non Euro-Canadian child. Through the learning program all children must be given the opportunity to explore the commonalities that bind the human family together, and the distinctive characteristics that make groups of people unique. It is practical to suggest that the Northern learning environment provides a golden opportunity to realize the objective of human understanding.

Interdependence: The sparesness of the population combined with geographic isolation underlines the need to emphasize the concept of the interdependence of the human community. Although social studies programs have traditionally given coverage to many aspects of the world community it is probable that only in very recent times has the importance of "mans" relationship to man" been felt with such urgency. Ecological considerations have played a major role in this regard. So too have pictures of planet earth taken from the recesses of outer space. Now, as never before, what takes place in terms of oil exploration on the Arctic Islands has global significance. Conversely, mercury pollution in the industrialized areas of the world can make its presence felt on the livelihood of Northern peoples. Other similar examples could be cited. The implication for education is clear. Children must be given the opportunity to expand their awareness of the delicate, often fragile, balance that exists between the human and physical resources of the world.

Adaptability: Change in itself is not a novel characteristic of the human condition. What is relatively new is the rapidity of technological and social change. Certainly, the impact of change has been, and is being felt, by Northern peoples with increasing regularity and with far reaching implications. Briefly, some of the changes can be mentioned:

- development of settlements replacing traditional hunting camps;
- growth of local government;
- improved communication in its many forms;
- wide spread use of snow track vehicles replacing traditional modes of travel;
- growing use of the cassette tape recorder as a quick, convenient means of "keeping in touch" with your friends, relatives, etc.;
- almost frantic search for oil and other resources;
- decline of traditional life pursuits. And so on.

Then there are the portended changes such as:

- the Anik sattelite: television and radio:
- a highway to the Arctic Ocean (from Fort Simpson to Tuktoyaktuk);
- pipelines;
- oil tankers.

Hopefully, the point is made. The North is experiencing increasingly rapid change. Clearly the learning program must do everything within its power to prepare people for change. In this sense the "future orientation" of the curriculum is of prime concern. Children can enquire into the past, as well as the present, but the overall objective must be in terms of using this information to try and predict what might be. Alvin Toffler in his book, Future Shock has put this proposition forward very succinctly:

> For education the lesson is clear: its prime objective must be to increase the individual's "copeability" - the speed and economy with which he can adapt to continual change. And the faster the rate of change, the more attention must be devoted to discerning the patterns of future events. It is no longer sufficient for Johnny to understand the past. It is not even enough for him to understand the present, for the here and now environment will soon vanish. Johnny must learn to anticipate the direction and rate of change....And so must Johnny's teachers.

THE PROGRAM

A Synopsis

Basic Consideration:

Life in a pluralistic society demands that the thrust of the social studies program must be in the direction of developing and enhancing human understanding.

Six Variables: At each level the program should be developed in terms of:

- the individual's quest for identity;
- reinforcement and refinement of personal attitudes and values;
- the influence of cultural models;
- understanding cultural conflict, its causes, extent, effects;
- the interdependence of the "global village";
- the impact of change in its many forms and the implications that change has for the adaptability of mankind.

The Approach: Certain learning skills can be employed by the individual in his quest for understanding. These skills may be classified as follows;

- Obtaining Knowledge: locating information
  acquiring information
  interpreting information
- Processing Knowledge: organizing and classifying
  evaluating information
  identifying problems
  developing relationships
  studying alternatives
  making choices
  understanding time (chronology)
- Acting Upon Knowledge:
  formulating and testing hypotheses
  planning strategies
  communicating effectively
  carrying actions to a satisfactory con-

clusion
developing confidence in decisions made

Mastery of "subject content" is of incidental importance. Content material is only the means whereby the individual can come to know and understand himself and his fellow man through enquiry and research into the human and physical environment - past, present, and future. A quotation from Teaching As A Subversive Activity is pertinent in this respect:

> If you are over twenty-five years of age, the mathematics you were taught in school is "old"; the grammar you were taught is obsolete and in disrepute; the biology, completely out of date, and the history, open to serious question. The best that can be said of you, assuming that you REMEMBER most of what you were told and read, is that you are a walking encyclopedia of outdated information.

Developmental Themes:

The following themes will indicate to the teacher the general area for exploration and development, depending upon the ages of the children involved.

- Five-Six year old children: initially, the child is given the opportunity to get to know "his world", both within and without the classroom. Gradually, as the child becomes aware of his "localized world view" the focus of attention shifts to enquiry into the nature of families, his own, those in his immediate environment, and eventually those foreign to his experience.
- Seven-Eight year old children: from the study of families the emphasis moves in the direction of studying larger groups of people, the interaction of peoples living as neighbours and on a community basis. The child's enquiry begins with an examination of the many facets of his community and expands to encompass communities on a Territorial, National, and International scale.
- Nine-Ten year old children: at this stage the perspective of the child can be broadened. Whereas, the individual has progressed from the point of learning about himself, family, neighbourhood, and community living, he can now proceed to explore the living habits of people on a Territorial and then Canada-wide basis. Through "case-studies", for example, the student can investigate the similarities and differences found in larger, more complex social settings. He can look for those ties that bind people together, as well as, those unique characteristics that are preserved as integral parts of one's cultural heritage.
- Eleven-Twelve year old children: the "how" and "why" of

human development now assumes importance. The historical roots of civilization are investigated, keeping in mind that the study of the dead past is not an end in itself. Rather, the past may provide insights into the present, and assist in comprehending the probable - the future.

Program Specifics

An Important Note:

The learning materials available in any program very often dictate the quality and extent of the program made available. In this respect, the materials recommended for use in Northern classrooms have been selected judiciously, keeping in mind that for many of the materials, comprehensive teacher guide books are available. For this reason no attempt is made herein to duplicate the detailed suggestions contained in the various handbooks. (The teacher should refer to the current Learning Materials Catalogue, the Educational Resource Centre catalogues, and to the material contained at the conclusion of this section, for further information on this point.)

Methodology: Activity centred methods which incorporate the broadest possibel range of media and activities are suggested. Included can be such things as:

- toys, games, manipulative objects;
- discussion pictures;
- filmstrips;
- listening materials (tapes, records);
- 16 m.m. film;
- kits of items (e.g. Jackdaws)
- maps, globes, charts;
- picture books (e.g. Arctic Readers, Dogrib books, Northern curriculum items generally);
- reference books (e.g. encyclopedia, National Geographic, Time-Life type publications);
- outdoor education experiences;
- art forms, arts and crafts, etc.;
- newspapers, periodicals;
- "junk" (e.g. string, gravel, glue, sticks, bones, fur, hide, odds and ends from the "backyard", water, flour, salt, papier mache);
- text books - ONLY AS A LAST RESORT.

The point is that children, who may well have difficulties coping with the printed and/or spoken word, should not be deprived of the opportunity to learn. Moreover, the development of the appropriate learning skills can take place only if the child is exposed to a great variety of "things". To lock a student into one text book and one work book and suggest thereby that this is learning is to miss the point.

Current Events: Depending upon his learning growth the eight-nine year old child should be gradually introduced into what is commonly referred to as "current events". As a regular feature of his social studies program time and opportunity should be provided to make it possible for the individual to investigate the world in which he lives. This implies that suitable materials will be made available. These may include:

- a local newspaper, as available;
- a Northern newspaper;
- magazines;
- films;
- listening materials (e.g. a taped newscast);
- video tapes, as available;
- interviews with visiting dignitaries;
- a major Canadian newspaper.

A word of caution with regard to selecting suitable items is in order. Highly pictorial, visual materials will make it possible for "reading' to take place. Keep in mind the problems posed by items which are essentially all text. Many commercially prepared items are exclusively American in their point of view. We owe it to the child to provide him with Canadian materials first, and American and other international items only as an extension of his Canadian perspective.

Thematic Materials:

For each aspect of the elementary program the following suggestions are made. These need not, nor should they be slavishly adhered to - they are ideas only.

- The One World Social Studies Program, (Fitzhenry and Whiteside Publishers), provides basic material for the study of Families, Neighbours, and Communities. The variety of discussion pictures with accompanying teacher's manual can be supplemented by using: the Tendi and Johnny books, the Arctic Readers, the Man and Communities series, (Fideler Representatives and Consultants, Publishers).
- For exploring the peoples and communities of the Northwest Territories and Canada there are several inexpensive, highly illustrated items available. These include: Then and Now in Frobisher Bay, (W.J. Gage and Company Publishers), Eskimo Journey Through Time, (Man in His World Series, Fitzhenry and Whiteside Publishers), Tendi, Johnny, and Arctic Readers, Nunaptinni with accompanying picture sets (N.W.T. Curriculum Division), Regional Studies of Canada (W.J. Gage and Company, Publishers), Sample Studies, (Ginn and Company, Publishers), Holt Sample Studies (Holt, Rinehart and Winston, Publishers), Royal Ontario Museum booklets on the native peoples of Canada, Canadian Jackdaws, (Clarke, Irwin Publishers), Concepts, A Series in Canadian Studies, (Griffin

House Publishers).

- For studying the historical roots of man such series as the Studies in Canadian History, (Ginn and Company, Publishers), Canadian Jackdaws, (Clarke, Irwin Publishers), Dogrib Legends, Arctic Readers, are all usefull.
- Of special interest to teachers working with students of ten years of age and older, and who are unfamiliar with how to approach the area of attitudes and values is the Contact and Involvement Series published by McGraw-Hill, Ryerson Company. Many creative approaches to the area of attitudes and values are suggested in both the teacher and student editions of this series.
- A recent 16 m.m. colour film program entitled Man and His World is available through the Educational Resource Centre. Over 30 individual titles are included in this program, each of which deals with one aspect of Man. This program will provide overall support for the entire social studies curriculum.
- A variety of other materials is listed at the conclusion of this section. Before purchasing and incorporating any materials into the program it is suggested that the "criteria for materials selection" be closely scrutinized by the individual teacher.

A Conceptual Outline: For each thematic area of study the teacher may wish to use for guidance purposes an outline such as the following.

THEME: The child's view of himself and his peers.

Concepts:

- The child begins to understand that individuals resemble each other; their body sturctures are similar.
- The child perceives that physical, emotional, and intellectual changes accompany human growth.
- The child perceives that although people have similar body structures, their physical appearances are different.
- The child becomes aware that humans have similar facial features, despite their similar features, individuals are unique.
- The child begins to understand that not only are their likenesses and differences among individuals, but there are also likenesses and differences among groups.
- The child begins to understand that people come from a variety of home environments.
- The child furthers his understanding of the likenesses and differences characteristic of people's living habitats.

A Conceptual Outline: For each thematic area of study the teacher may wish to use for guidance purposes an outline such as the following.

THEME: How Families live.

Concepts:

- The child begins to understand that families are social units which may differ in from (size and composition), in social

position, in cultural background.
- The child begins to perceive that the family serves many functions: providing food, providing protection, raising children, providing recreation.
- The child perceives that the family is a network of relationships which include ties of affection, a sense of belonging, patterns of authority, and responsibilities for the individual members.
- The child becomes aware that families change in terms of the family cycle and that families have to adapt to changing circumstances as when family settings change through time and families move to new locations.

A Conceptual Outline: For each thematic area of study the teacher may wish to use for guidance purposes an outline such as the following.

THEME: Families and Communities.

Concepts:
- The child perceives that communities are social units which may differ in form, (size, composition), and in culture.
- The child comes to understand that communities serve many functions as for example: the production, distribution and consumption of food and services; governing some activities of its members; providing protection and security for its members; educational and socializational services; provision for opportunity for religious expression.
- The child perceives that the community is a network of relationships including: patterns of authority, patterns of responsibility, sense of belonging, ties of friendship, ties of association, ties of kinship.
- The child becomes aware that communities change with respect to seasonal, environmental, and social and cultural variables.

A Conceptual Outline: For each thematic area of study the teacher may wish to use for guidance purposes an outline such as the following.

THEME: The peoples of the Northwest Territories and Canada.

Concepts:
- The child begins to understand that people have similar physical needs.
- The child begins to understand that emotional needs are similar.
- The child begins to understand that people need food and water to stay alive and that people have different ways of acquiring these necessities.
- The child furthers his understanding that people wear different clothing depending on where they live and the materials that are available.
- The child begins to understand that people build houses to

shelter them from the weather, and use various kinds of materials to build them.

- The child becomes aware that many people are involved in the production of the goods and materials necessary for living.
- The child gains further insight that individuals use the resources available to them, and that people help others use their resorces.
- The child perceives that interaction among people is essential.

A Conceptual Outline: For each thematic area of study the teacher may wish to use for guidance purposes an outline such as the following.

THEME: The historical roots of man.

Concepts:

- The child becomes aware of the existence of the past.
- The child begins to perceive the present in relationship to the past.
- The child becomes aware that the past is recorded in different ways.
- The child begins to understand that the past has affected his present, and the present will affect his future.
- The child begins to understand that Canadians have different cultural heritages from the past.
- The child comes to have a deeper understanding of the diverse cultural heritages which have contributed to Canada's growth and development.
- The child begins to understand that people's living habits change with time.
- The child becomes aware that he is linked to specific ancestors and that his own cultural heritage is unique.

NOTES ON SELECTING MATERIALS

Many readily available learning materials in the Social Studies field are prejudiced against Indian, Eskimo and Metis people. This unwarranted situation is changing but the fact remains that classroom and libraries contain a multiplicity of materials, print and non-print, that do nothing to develop positive understandings among ethnic groups or assist in the growth of feelings of pride in oneself and in one's heritage. Obviously, the sensitive teacher will have to use judicious discretion in making choices with regard to the use of these materials.

A number of guidelines are offered for consideration in terms of materials selection.

1. Loaded Terminology - Certain words find repeated use in the historical treatment of Canada's original peoples. Some of these are: savage, pagan, half-breed, squaw, primitive, red-skin, buck, natives, heathen, uncivilized, etc. Words of this genre disparage non-white peoples to the point that they become non-entities.
2. Historical Inaccuracies - Inevitably a description of White - Indian conflict

portrays the glorious victories of the British-French forces and the bloody massacres of the "savages". In the same vein "scalping" is both exaggerated and inaccurate in terms of the usual circumstances described in the pages of history. Seldom, if ever, does the student of school realize that "scalping" was introduced, encouraged, and exploited in parts of North America by the white man. More significantly, the Indian is typically protrayed as the villain of the piece. Little recognition is given to the aboriginal rights of these people - "they, as proud nations of people, were the proprietors of what is now Canada". Incredible as it may seem, the classroom has tended to ignore this fact while concurrently inculcating a distinctly jaundiced view of such racially torn areas as Rhodesia, South Africa and the American Deep South. Common sense, not to say decency, dictates that this is one more double standard that should be discarded.

3. Historical Omission - Beyond portraying Louis Riel as a treasonous madman, the Metis people receive scant consideration in the typical classroom. It should be noted that whether or not a man is a hero or a villain depends frequently upon who wins the struggle and it is the winners who write the history books.

   The Eskimo people until very recently received no mention at all since few people knew much about them save that they lived "up there" - meaning the top of the map. This vacuum is beginning to be filled but unfortunately much material is either patronizing or simply inaccurate. The message that clearly comes across in many instances is one of the "quaint little people, eating raw flesh and having rather peculiar living habits in a virtually uninhabitable region". So much for the amateur anthropologists!

   Indian peoples usually disappear from the pages of history along about the time of Louis Riel and the signing of the treaties. Once the people were placed on reserves they were conveniently forgotten by many people including most historians. Moreover, the prevailing school of thought was that in one hundred years or less the people would be gone or assimilated. Fortunately, people were wrong in both counts and the Indian peoples, with cultures and languages intact, have survived.

4. Hollywood Images - Wigwams, tipis, feathers, loin cloths, tomahawks, quivers of arrows are all part of the sorry nonsense perpetrated by the film industry that has gone far toward degrading the Indian persons self-concept. The teacher can judge for himself just how far this process had gone by assigning to Indian children an art project centered on an Indian theme. Sadly enough, the illustrations commonly depict "Hollywood" influences rather than approximations of reality.

   In a like manner, film strips, prints and commercially prepared slides often reinforce the stereotypes of the half-naked red-man chasing the buffalo, for example. Overall, authenticity is not a strong point in numerous pictorial materials.

5. Absence of Models - The non-white child has few, if any, models for identification purposes in most available social studies materials. Whereas the white child can learn about and identify with the great inventors, the explorers, political leaders, missionaries, athletes, film stars, astronauts, etc., (most of whom are white people), the non-white child is traditionally

provided with no "models" or "ideals". The greatness of a Poundmaker, Akaitcho, Edzo, Matonabbee is not usually displayed as a viable example that might provide the child with motivation and stimulation. Similarly scant reference is made to the inventions, developments and contributions of the Indian - Eskimo people to the overall development of Canada. Transportation, diet, clothing, housing, medicine, and the arts are some general areas where the story has not been told, and credit has not been given.

Recommended Materials

One World Social Studies Program
(Fitzhenry and Whiteside)

How Families Live: 87 Discussion pictures and Teacher's Manual	65.00
Families and Communities: 96 Discussion pictures and Teacher's Manual	69.00

Man and Communities
(Fideler Representatives and Consultants)

Families Around the World	5.85
Needs of Man	5.85
Earth and Man	6.60
Great Ideas of Man	6.60

Eskimo Study Prints
(Encyclopedia Britannica)

Set of Ten Pictures: Netsilik people	14.90

World Community Studies
(W.J. Gage and Company)

Then and Now in Frobisher Bay	1.20
Teacher's Guide	.50
Multi-Media Kit	42.50

Man In His World Series
(Fitzhenry and Whiteside)

Eskimo Journey Through Time	1.80

Ryerson Social Science Series
(McGraw-Hill Ryerson Ltd.)

Contact: Student's Text	4.95
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Canada: A Visual History (Thomas Nelson and Sons)	6.95

The Illustrated Natural History of Canada Series

(Educational and Library Division)
The Illustrated Natural History of Canada
58 Northline Road, Toronto 374.

The Great Lakes	6.95
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Indian-Eskimo Prints (Set of Six, (National Sport Stores)	
Historical Prints (2 Sets) [Confederation Life]	5.00 each.
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Canadian School Atlas (J.M. Dent)	1.75
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Canadian School Atlas (Thomas Nelson)	2.45

Resource Materials for Teachers

A Guide to Understanding Canada (Guiness Publishing Co.)	3.84

Issues for the 70's

Canada's Indians (Paperbound) [McGraw-Hill]	2.10
The Unjust Society (Paperbound) [M.G. Hurtig]	2.75
Life With The Esquimaux (Historical Journal) [M.G. Hurtig]	8.95
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Periodicals (Newspapers-Magazines)

Boreal Express (Student History Paper) [Clarke-Irwin]	5.00/12 Issues
Canada and the World (Student Current Events) [World Affairs Press]	
One Subscription	2.00
Two to Fourteen Subscriptions	1.75
Fifteen or more Subscriptions	1.50
Akwesasne Notes (Digest of Native News) [Akwesasne Notes]	5.00/12 Issues
Kainai News (S. Alberta Paper) [Kainai News]	3.00/12 Issues
The Native People (Alberta Paper) [The Native People]	3.00/12 Issues
The Beaver (Quarterly) [Hudson Bay Co.]	3.00
The Northian (Magazine) [University of Saskatchewan]	5.00
Tawow (Native Culture) [D.I.A.N.D., Ottawa]	1.00/Issue
North (N.W.T.) [D.I.A.N.D., Ottawa]	3.00/6 Issues
Indian News (Newspaper) [Oblate Fathers]	2.00/6 Issues
Indian Record (Newspaper) [D.I.A.N.D., Ottawa]	Free.
News of the North (N.W.T. Newspaper) [News of the North]	7.50/52 Issues
Tapwe (N.W.T. Newspaper) [Boreal Press, Hay River, N.W.T.]	4.00/52 Issues
Hay River News (N.W.T. Newspaper) [Hay River News, Box 355 Hay River, N.W.T.]	5.00/52 Issues
Peel River Press (N.W.T. Newspaper) [Peel River Press, Fort McPherson, N.W.T.]	3.99/24 Issues
The Drum (N.W.T. Newspaper) [T. Butters, Box 1069 Inuvik, N.W.T.]	10.00 Annually
Keewatin Echo (N.W.T. Newspaper) [Adult Education Center, Fort Churchill, Manitoba]	Free
The Listening Post (N.W.T. Newspaper) [Adult Education Center, Frobisher Bay, N.W.T.]	Free
Eskimo (Northern Periodical) [Oblate Fathers, Churchill, Manitoba]	Free
Tundra Times (Alaskan Newspaper) [Tundra Times, Fairbanks, Alaska]	8.00/52 Issues

THE YELLOW PAGES

Aviation
Birds
Carving
Cassette Recorder
Consumer Living
Explorers
Fish
Insects
Inventions
Language
Learning Environment
Library
Listening Materials
Local Employment
Mammals
Natural Wonders
Net Making
Northern Places
Northern Things
Organizing the School Day
Photography
Plants
Record Keeping
Rocks and Minerals
Sewing
Shellfish
Ships
Snails
Teaching Team
Using What is Available

AVIATION CONCEPTS TO EXPLORE

1. Airplanes come in different shapes and sizes.
2. Northern bush planes do many kinds of work.
3. The pilot flies the plane but the work of many people goes into keeping the plane airworthy and ready to fly.
4. Weather is an important factor in flying safely.
5. In planning flights and navigating safely from place to place, the pilot uses many different kinds of instruments and information.
6. All airplanes have certain features in common and are controlled by the pilot in the same manner. Certain basic instruments are found in all planes.
7. Airstrips and airports are vital to the needs of Northern communities.
8. General aviation has a recent history and a spectacular growth; many Northern aviation pioneers are still involved in the industry; general aviation is an important part of transportation in Canada and the world.

AVIATION EXPRESSIONS

Tailwind
Weather "out"
Instrument flying
Headwind
Icing condition
C.V.U.
Zero-Zero visibility
Air pockets
Wind sock
Turbulence
Cross wind
Bank
Ceiling
Gravel Strip
Downdraft

CHILDREN CAN ...

Use these expressions in a make-believe situation involving a "pilot" and an "air traffic controller".

Find out about similar expressions by interviewing a pilot.

Draw pictures illustrating the meaning as they understand the expressions.

Write a story containing some of these expressions.

Think-up expressions one might use to describe land or boat travel.

INTERNATIONAL PHONETIC ALPHABET

A - Alpha
B - Bravo
C - Charlie
D - Delta
E - Echo
F - Foxtrot
G - Golf
H - Hotel
I - India
J - Juliette
K - Kilo
L - Lima
M - Mike
N - November
O - Oscar
P - Papa
Q - Quebec
R - Romeo
S - Sierra
T - Tango
U - Uniform
V - Victor
W - Whiskey
X - X ray
Y - Yankee
Z - Zulu

CHILDREN CAN ...

Pretend they are radio officers on an aircraft and try to convey a message using this alphabet.

Figure out the call-letters for Northern aircraft as for example: Atlas Aviation is W.W.P. or Whiskey - Whiskey Papa.

Make-up stories in "code" using this alphabet.

Use play telephones and try to communicate with one another.

AIRPLANE PARTS

- Spinner
- Landing Gear
- Wing strut
- Wing
- Right wing aileron
- Flaps
- Fuselage
- Horizontal stabilizer
- Fin and Dorsal
- Rudder
- Elevator
- Left wing aileron
- Door
- Seat
- Windshield
- Engine cowl
- Propellor

INSTRUMENT PANEL

- Air speed indicator
- Gyroscopic compass
- Artificial horizon
- Altimeter
- Turn-and-Bank indicator
- Vertical speed indicator
- V.H.F. navigation
- Fuel guage
- Oil pressure guage
- Oil temperature guage
- Suction indicator
- Tachometer
- Battery-generator indicator
- Control wheel
- Clock
- Rudder pedals
- Carburetor heat control
- Throttle control
- Fuel-air mixture control
- Wing flaps control
- Trim tab control
- Magnetic compass

NORTHERN AIRCRAFT

Cessna 185

(MAKE A PICTURE FILE)

Otter

Beaver

Aztec

(MAKE A MOBILE)

Twin Otter

(MAKE SOME MODELS)

D.C. 3

Sky Van

Beechcraft

(DO SOME MAP WORK)
air routes

(COMPARE AND CONTRAST)
size, speed, capacity.

Bristol

(MEASURE THE AIRSTRIP)

Hawker-Sidley

D.C. 4

D.C. 6

(EXPLAIN A PROP-JET)

Electra

Hercules

Boeing 737

(WHAT'S A JET?)

Lear Jet

(INTERVIEW A PILOT)

Helicopter

(WHAT ARE SOME OTHER PLANES?)

BIRDS OF THE NORTH

SUMMER VISITORS

Common Loon
Yellow-billed Loon
Arctic Loon
Red Throated Loon
Whistling Swan
Fulmar
Canada Goose
Brant Goose
Black Brant
White-fronted Goose
Snow Goose
Blue Goose
Ross' Goose
Pintail
Common Eider
King Eider
Red-breasted Merganser
Rough-legged Hawk
Golden Eagle
Peregrine Falcon
Sandhill Crane
Ringed Plover
Golden Plover
Black bellied Plover
Ruddy Turnstone
Whimbrel
Harlequin Duck
Purple Sandpiper
Pectoral Sandpiper
Hudsonian Godwit
Red Phalarope
Northern Phalarope
Herring Gull
Ivory Gull
Arctic Tern
Horned Lark
Water Pipit
Common Redpoll
Tree Sparrow
Lapland Longspur
Goldeneye
Pomarine Jaeger
Glaucous Gull
Iceland Gull
Great Black Backed Gull
Short-eared Owl
Wheatear
Hoary Redpoll
Savannah Sparrow
White-crowned Sparrow
Snow Bunting
Mallard
Green winged Teal
Blue Winged Teal

YEAR AROUND INHABITANTS

Gyrfalcon
Willow Ptarmigan
Rock Ptarmigan
Thick-billed Murre
Black Guillemot
Snowy Owl
Common Raven

CHILDREN CAN. .

Make a log book of local birds
Keep a record of when first sightings are made in the spring....
Tape bird calls
Look for nesting sites
Examine feathers under a microscope
Build a feeding platform and observe. ...
Read some legends about the Raven
Write something about how birds benefit man
Draw some pictures
Look at bird books

A CARVING PROGRAM

Some things to get:

Soapstone - about 10 lb. per pupil at 8¢ per lb.
Some bone and antler from local sources.
Steel wool - $5.00 worth.
Glue - $5.00
Hack saws - $20.00
Files - about 20 assorted - $20.00
Chisels - about 20 assorted - $20.00
Sandpaper - assorted - $10.00
Odds and ends - $15.00

(N.B. all costs are approximations)

Some people to see:

A local carver might be hired on contract or through casual funds to work with the teacher and the students.

Invite the guidance of Arts and Crafts people in terms of setting up the program.

Your principal and/or superintendent can assist with the budgeting and the details regarding the employment of local resource people.

CASSETTE RECORDER

Have some children tape, in the local language, the recollections of a community elder.

Use the tape for classroom discussion - and have someone translate the recollections into English.

Illustrate what was heard on the tape.

Begin a school collection of tapes, translations and pictures.

Have some children do a settlement survey on some topic.

Tape a drum dance - a tea dance - use in the music program.

Record the sounds of the seasons - water running down a hill; sounds of shifting ice; a winter wind;ice break-up. Discuss the sounds of nature.

What are the sounds of the settlement?-- dogs howling; snowmobiles; aircraft starting up; the bombardier; church bells; a community dance; chipping soapstone; the power plant; a truck on a cold morning; the crunch of snow underfoot; a power saw; the crack of a whip; children's laughter. Let different groups of kids do the taping and then let the rest of the class guess and discuss the various sounds.

Draw pictures of what is heard.

How many bird and animal sounds can be collected - arrange a field trip in fall and spring periods. Compare what was heard.

Record the sounds of home - boiling water for tea; people talking and laughing; a baby crying; carving meat; a fire in a wood burning stove; a creaky door; wind whistling around the eves; men carving-up a seal, a caribou, a moose, etc.; sounds from the radio or record player; a puppy's whimper. Write some stories about what might be happening as each sound is played back to the class. Play some guessing games.

Talk to various people about their occupations - the priest, store keeper, settlement manager, maintenance men; R.C.M.P., radio operator, pilot, councillor, chief, co-op manager, fire chief, nurse, carver, print-maker, craft shop people. Use for talking about various jobs. Tape material in one language and translate in another.

CONSUMER LIVING

SOME THINGS THAT ARE TAKEN FOR GRANTED IN A COMPLEX SOCIETY

Opening a bank account
Writing a cheque
Having a savings account
Borrowing money
Paying interest
Buying a license for a car
Buying insurance
Buying on "time"
Making "time payments"
Filling out forms
Paying income tax
Contacting a lawyer
Dealing with the police
Understanding government agencies
Applying for a job
Going for an interview
Writing an application
Knowing about social welfare
Using a catalogue
Going to a doctor, dentist
Understanding advertising
Knowing about political parties
Comprehending elections/voting
Coping with bureaucrats
Paying for pension plans
Joining a union
Receiving job "fringe" benefits
and many more ...

THINK CAREFULLY

If you are raised in an urban middle class environment you take these things and many others in your stride. You learn by being exposed and by going through the "hoops" yourself. Suppose, on ther other hand you are a Northern student in grade five or six and because of your age you are planning to quit school and look for a job. How well prepared are you for coping with some, or all of these things? It may well be that some time after leaving school you will move south - and then what? You may then find yourself very, very lost in terms of just being able to survive much less cope with the world around you. What's the answer? It would help a lot if each school would work out a local program designed to meet the "survival" needs of the potential drop-out. If there is time in school for the 3 R's then there is time for a 4th. R - Readiness for living!

Roald Amundsen
Horatio T. Austin
George Back
William Baffin
Sir Joseph Banks
Sir John Barrow
Frederick Beechy
Edmund Belcher
George Beste
Felix Booth
David Buchan
Thomas Button
Robert Bylot
Captain Christopher
William Cornwallis
Captain Crozier
John Davis
Peter Dease
Luke Foxe
John Franklin
Martin Frobisher
Charles Hall
Samuel Hearne
Robert Hood
Henry Hudson
John Irving
Thomas James
Le Vesconte
Robert McClure
Lord Melville
Edmund Parry
Robert Peary
John Rae
Knud Rasmussen
John Ross
Edward Sabine
George Simpson
Vihjalmur Stefansson
Otto Sverdrup
Joseph Bernier
Bishop W.C. Bompass
Charles Camsell
W.J. D. Dempster
Fr. Henri Grollier
Charles Klengenberg
Gilbert Labine
Alexander Mackenzie
MacLeod Brothers
Fr. E.F.S.J. Petitot
Rev. James Evans
Revillon Freres
Bishop Stringer
Joseph B. Tyrrell
Punch Dickens
Wop May
Peter Pond
Gordon Latham
Robert Bylot

HERE ARE SOME NAMES

Some may be important, some not
Some may be interesting, some not
Some may have some lasting significance
Some may be reputable, some not
Some may have done as much harm as good
Some may be worth reading about, some not

ONE THING IS CLEAR AND THAT IS THAT NOT A SINGLE ATHAPASKAN OR ESKIMO PERSON'S NAME APPEARS ON THE LIST

THEREFORE, it might be a lot more interesting and valuable to have students do some research on the people who met and helped these people to do their thing!

To help you get started here are a few:

Akaitcho
Edzo
Iggiarjuk
Attagutaluk

OBVIOUSLY, this is an embarrassingly short list — Maybe in the space of one short school year a whole lot more can be uncovered.

FISH FOUND IN NORTHERN WATERS

Lamprey
Atlantic Sturgeon
Lake Sturgeon
Pacific Herring
Brook (char) trout
Arctic Char
Arctic Cod
Atlantic Cod
Pacific Tom Cod
Three Spine Stickleback
Lake Trout
Atlantic Salmon
Large Whitefish
Lake Herring
Smelts

Capelin
Wolf Fish
Spotted Snake Blenny
Arctic Eelpout
Arctic Sandlance
Greenland Shark
Atlantic Prickly Skate
Spiny Dogfish
Northern Pike
Longnose Sucker
Emerald Shiner (minnow)
Rose Fish
Two Horn Sculpin
Arctic Flounder
Alligator Fish

CHILDREN CAN ...

Catch some fish
Find out names of fish in the local language
Measure the length of various fish
Examine the bone structure
Dry a fish skeleton and make a mobile
Investigate methods of preserving fish - drying, smoking, freezing ...
Discuss the economics of fishing
Set some fish nets
Learn about traditional methods of fishing
Make a scrap book of Northern fish
Explore the economics of Northern Sport Fishing - guides and camps
Examine the consequences of water pollution
How does a fish breathe, how does a fish swim.

INSECTS TO COLLECT AND STUDY

Crab Spider
Springtails
Mealybug
Caddis Fly
Tussock Moth
Tiger Moth
Sulphur Butterfly
Arctic Blue Butterfly
Water Beetle
Ground Beetle
Bumble Bee
Crane Fly
Sandfly
Hover Fly
Carrion Fly
Northern Blowfly
Arctic Midge
Cabbage Maggot
Muscoid Fly
Blackfly
Seal Louse
Tapeworm
Sea Worm
Marine Worm
Lug Worm
Dragon Fly
Damsel Fly
Reindeer Warble Fly

CHILDREN CAN ...

Collect and preserve local insects
Look at them under a microscope
Learn about the various parts
Draw diagrams of what they see
Find out the names of insects in the local language
Discuss how insects help and hinder animals and man
Learn about the balance of nature
Hatch some insects
Collect samples of pond water
Learn about insecticides - their use and abuse
Find out about the descriptive names that some insects have been given as for example the Hover fly, the Damsel fly....
Learn about the life cycles of local insects
Relate the study of insects to the study of local birds
What do insects eat in their various stages of development
Find a cocoon
Make an insect net out of a nylon stocking and some rabbit wire
Capture the sounds of insects on tape
Relate the study of insects to the study of fish.

INVENTIONS-ADAPTATIONS-DEVELOPMENT

Babiche
Canoes
Moss Bag
Tumpline
Crooked knife
Snow goggles
Ulu
Umiak
Komatik
Mukluks
Snow knife
Kayak
Toboggan
Snow shoes
Amauti
Kudlik
Fan hitch
Edeh
Atigi
Tandem hitch
Parka
Kamiks
Snow house
Cache
Inukshuk
Harpoons
Arrow heads

Identify each of these items

Learn the names of each in the local language

Find more examples of Northern inventiveness

Interview some old people about the use of each

Make some miniature models

Examine the natural materials used in their manufacture

Explore the differences between types of snow shoes, canoes, dog hitches .... What accounts for the variations in shapes and sizes ...

Begin and/or extend a school museum collection of artifacts, traditional clothing ...

Take some pictures and use for a history book, discussion, scrap book ...

LANGUAGE

What to do?

Assuming that in the school there is no one (teachers or teachings assistants) who speak the language of the settlement people well enough to use it in the classroom - what other arrangements can be made?

Involve your school committee in this matter - give them the opportunity to assess the situation and to make recommendations.

Consult your principal and superintendent with respect to employing a local person who can come to the school and assist the teacher and who can use the local language to advantage. The school committee may wish to suggest possible candidates for this type of work.

Establish hours of work and rates of pay - keeping in mind prevailing pay scales in the settlement.

In a similar fashion a program whereby adults can come into the school on a regular basis to tell the children stories about the traditions and events of the past can be established. The utilization of the local language in this respect should be given every encouragement. A program like this affords an excellent opportunity to build a school library collection of taped materials.

LEARNING ENVIRONMENT

SOME THINGS TO CONSIDER

Organize a number of interest centers -

science table
nature table
math corner
aesthetic display
(art, music)
junk
toys and games
listening centre
a "quiet" place
crafts table (with simple tools)

Change the materials and displays at frequent intervals.

Get some cushions and place them in a suitable location so that children can take their books there for browsing and reading.

Use bulletin board space to reflect interests and contributions of the pupils - make changes at frequent intervals.

Select books that children can read and which are of interest to them - materials should be characterized by their variety; subject matter, size, shape, hard or soft cover, comics, catalogues, illustrations, size of print...

Cabbage onto an old armchair or two that a child can curl up in and be comfortable while thumbing through a book. (Staff room furniture may be a good place to start).

Show children how to operate a cassett tape recorder, record player, individual filmstrip previewer and make the necessary materials available so that individuals or small groups can get together and use them.

Set-up a water table - an old tub will do - where children can sail boats, discover what floats, explore aspects of volume with various containers.

Make a puppet theatre out of cardboard boxes - children can construct puppets out of odds and ends available locally - try the co-op, craft shop, etc.

Construct a small platform out of scraps of boards and use for dramatizing plays and skits devised by the pupils.

Have a sewing corner with bits of cloth, beads scraps of hide and fur, assorted needles and thread, yarn....

LIBRARY - LEARNING MATERIALS CENTRE

GETTING STARTED

Make a list of everything in the school that could be categorized as learning materials. Probably this project can be best carried out by the staff of the whole school under the direction of the principal or someone delegated by him.

Included on the list should be -

- all available text book titles
- all fiction and non-fiction
- sets of pictures
- filmstrips
- tapes
- records
- toys
- games
- maps
- globes
- listening posts
- filmstrip previewers
- tape recorders
- record players
- overhead projectors
- opaque projectors
- periodicals
- learning kits - math, science, . .
- 16 m.m. projectors
- cameras
- any other similar things

Start sorting on the following basis:

TEXT BOOKS	Select the text books which should go to particular classrooms. Then pick out the text books which are not needed in a particular room but which could be used for reference by a number of classes. Set these aside. Finally, make a pile of those books which have outlived their usefulness but which could be cut-up for pictures, work lists etc. Get rid off what is left.
FICTION - NON FICTION	Sort the fiction in terms of approximate reading levels, then subdivide in terms of interest areas. Record the following data for each book on a 3 x 5 file card: title, author, publisher, date.
LIBRARY - continued	For the non-fiction start by selecting the various sets of books like encylcopedia, Time-Life series, etc. Individual books should then be sorted according to reading levels. Finally, group books by subject or topic. Record data for each book on

	file cards as with fiction books.
PICTURE COLLECTION	Commercially prepared sets of pictures can be set aside. Then go through magazines, discarded books and the like and collect together those pictures that could be mounted on construction paper and placed in a vertical file for future use. Set up picture (vertical) file by topic. (To help to preserve pictures cover with saran wrap or use plastic spray or send to Educational Resource Centre, Yellowknife for mounting and laminating).
FILM STRIPS	Group filmstrips by rough ability levels such as primary, elementary, junior and senior high. Then arrange by subject area. Put such data as title, approximate grade level, subject area on a file card or in a three ring binder for future referral.
TAPES AND RECORDS	Discard the torn, scratched, and damaged. Arrange and record pertinent data as for filmstrips.
TOYS AND GAMES	Decide at the outset if some of these have to be kept in certain classrooms on a regular basis. For those of general, but periodic use classify by rough age range, and subject area. Record pertinent data on file cards.
MAPS AND GLOBES	Arrange by following categories' political and/or relief type, grade and subject level use. Record pertinent data on file cards.
PERIODICALS	Retain those that have long term use such as National Geographic, North, Beaver, and other quality publications. Look through the remainder and save pictures for the vertical file. Then discard. Classify magazines by approximate reading levels, interest areas. Record such data as title, publisher's address, subject area, reading level, dates of commencement and termination of subscription and price.
LEARNING MATERIALS KITS	Included in this category are such items as S.R.A. kits, portable science kits (E.S.S.), Math apparatus, Continuous Progress Lab kits, Jackdaws, etc. These should first be grouped in terms of those that have to be in a specific classroom on a year round basis and those that have general and periodic use. Then group by approximate grade and interest levels. Record pertinent data on file cards or in a three ring binder.

HARDWARE ITEMS

This category includes all of the equipment; projectors, tape recorders, record players, cameras, screens, extension cords, portable tables and the like. Compile a record book which contains a description, serial number (if any) and pertinent comments as to the condition of the item. Decide on a school procedure for maximizing the use of these items.

THE HARD PART

Once the material is sorted, classified and catalogued - and perhaps most important once every one knows exactly what is in the school to work with in the way of materials and equipment the decision has to be made as to where to locate the library - learning materials centre, assuming that your school has no specific facility. Moreover a decision has to be made as to whom will assume responsibility for the library again assuming that there is no librarian's position. In helping to make these decisions consideration should be given to the following: (a) the critical importance of the library in terms of the overall effectiveness of the school program, the library is the number one priority; many schools are cramped for space but perhaps a little used office, staff room area, or central foyer could become a miniature library; an area of easy access for children and teachers alike is basic; someone has to be in charge if for no other reason than to keep the learning materials centre functioning smoothly; a simple checking in and out procedure should be established at the outset; portable book shelves and projection and science tables can be a real asset in schools lacking a specific library area.

UP-GRADING WHAT YOU HAVE

Ordering learning materials can be a very dicey business. There is so much available that it is difficult to know where to begin. Some guidelines that might help are: Look for variety - many schools have books and not much else. Books may be okay but there are many more interesting and enjoyable ways of getting information than by sheer reading alone. Listening, playing games, manipulating objects, looking at pictures (still and motion) are some of these ways. Purchase materials that encourage the student to utilize all of his senses and all of his faculties. If your school does need more print material - again look for variety and think of the child who will be expected to utilize what you have in mind. (School book collections are notorious for containing books that no one in his right mind would think of reading unless he was forced to by a well meaning but unthinking teacher). Furthermore, use great discretion in choosing print materials, particularly those whose aim it is to prejudice the reader against ethnic groups. Another BIG factor concerns getting maximum mileage out of your budget bucks. A lot of useless garbage can be palmed off as the latest in educational gimmicky. Rather than taking the plunge on something that reads well in a catalogue but which you are unsure about - write to the company and get approval copies first, or at least, contact the Curriculum Division since an evaluation may be available from that source. Look for things that turn kids on. Learning materials are not necessarily found in educational catalogues, per se. Department store toy catalogues, Novelty companies and the like are worth exploring. Weigh the pros and cons of purchasing a "kit" of materials. Often what you are really paying for is mere convenience. In situations like this you should look at the cost of the component parts and see if it would not be cheaper and wiser to assemble a "homemade" kit.

LISTENING MATERIALS

Oscar Brand - Children's Concert. (Wonderland label +1438)
Edith Fowke - Sally Go Round The Sun (R.C.A. label +T-56666)
Alex Laurier - The Lollipop Tree (Arc label +A-744)
Ernest Coombs - Mr. Dress Up (Dominion label +48506)
Bob Homme - The Friendly Giant (Dominion label +48505)
Alan Mills - Folk Songs for Young Folk (Dominion label +1280-81)

Canadian Folk Songs (R.C.A. Victor label +C.S. - 100)
Folk Songs of Canada (Bowmar label +B 100 LP - B)
Canadian Folk Dances (Bowmar label +B-216 LP)

The Sesame Street Book and Record (Columbia label +CS-1069)
Susan Sings Songs from Sesame Street (Scepter label +sps - 584)
Pete Seegar Children's Concert at Town Hall (Harmony label +HS - 11284)
The Limeliters Through Children's Eyes (R.C.A. +LPM - 2515)
Peter, Paul and Mommy (Warner Bros. label +1785)
Folk Songs for Children (Prestige International label +INT - 13073)
Tom Glazer Sings for and with Children (Wonderland label +1452)
Tom Glazer's Second Concert for and with Children (Wonderland label +1467)

Darby O'Gill and the Little People (Disneyland label +ST - 1901)
Anderson's Fairy Tales (Paris label +PA - 644)
Mary Poppins (Happytime label - +1034)
Maurice Evans Reads Winnie-The-Pooh (Pathways of Sound label +POS 1032)
Maurice Evans - More Winnie-The-Pooh (Pathways of Sound label +POS 1034)
Peter and the Wolf (M.G.M. label +CH - 505)
Arabian Nights (Golden Wonderland label +GW - 212)
Mowgli - Jungle Book Adventures Rudyard Kipling (Happytime label +HT - 1052)
Dr. Seuss Presents The Cat in the Hat Songbook (Camden label +CAS - 1095)

CHILDREN CAN ...

Sing Along
Hum Along
Enjoy the rhythm
Laugh at the Stories
Learn about their own country
Learn about other countries
Play the record player
Express their likes and dislikes
Compare with their own musical heritage
Make up their own words
Express themselves through motion
Write about what they hear
Acquire English in an enjoyable, incidental way....

LOCAL EMPLOYMENT

Setting-up a schedule

Length of program - number of weeks

How many hours per school day?

Total hours per week for individual to be employed

Rate of pay on an hourly basis - check to be sure of prevailing pay scales

Method of payment - is it to be on contract or through casual funds?

Plan each individual program in this fashion - sometimes it will be easier to work out a weekly rather than hourly pay rate as for example if a week long trip out into the bush or on the land is planned.

WORK OUT YOUR COMPLETE PROGRAM IN CO-OPERATION WITH YOUR LOCAL SCHOOL COMMITTEE SINCE THEIR KNOWLEDGE AND SUPPORT CAN HELP TO ENSURE THE SUCCESS OF THE VENTURE.

NORTHERN MAMMALS

LAND MAMMALS

- Masked Shrew
- Arctic Shrew
- Arctic Hare
- Arctic Ground Squirrel
- Barren Ground Grizzly
- Polar Bear
- Red-backed Vole
- Tundra Vole
- Collared Lemming
- Brown Lemming
- Red Fox
- Arctic Fox
- Ermine
- Least Weasel
- Wolverine
- Timber Wolf
- Coyote
- Barren-ground Caribou
- Peary's Caribou
- Musk-ox
- Moose
- Dall Sheep
- Otter
- Reindeer
- Muskrat
- Snowshoe Rabbit
- Black Bear
- Mink
- Marten
- Hoary Bat
- Red Bat
- Lynx
- Beaver

SEA MAMMALS

- Right and Bowhead Whales
- Greenland Bowhead Whale
- Finback Whale
- Common Finback
- Lesser Rorqual
- Ringed Seal
- Harbour Seal
- Blue Whale
- Humpback Whale
- Killer Whale
- Harbour Porpoise
- White Whale
- Narwhal
- Hooded Seal
- Bearded Seal
- Harp Seal
- Atlantic Walrus

CHILDREN CAN ...

Collect some bones ... measure them ... assemble them ... weight them ....
Make a book of fur samples
Learn the names of local animals in the local language
Build a Northern zoo with plastecine models
Look for animal tracks and make some diagrams
Find out how to tan and clean hides
Stretch some pelts
Set snares
Maintain a trapline
Search for dens
Discuss the economics of the fur trade ... sport hunting
Explore methods of conservation
Learn about "shooting with a camera"

NATURAL WONDERS

Some assorted odds and ends

Drumlin
Pingo
Tundra
Candled ice
Floe Edge
Ice Hummock
Tree Line
Canadian Shield
Barren Lands
Glacier
Ice Berg
Sea Ice
Pressure Ridges
Delta
Fiord
Ice Islands
Pack Ice
Ice Cap

SOME THINGS TO DO

Look for some more natural wonders in the local environment

Try and identify as many of these as you can

Look for some pictures

Draw some pictures

Use a map or a globe to locate some of these

Find out if there are ways to express these things in the local language

How do these things help and hinder man

Make some simple models of the various formations

NET MAKING AND FISHING

Some things to get:

Packing twine
Floats
Twine

Supplies per net cost about $15.00

Figure on about one net for every three boys

Local arrangements;

Plan with local people the time, location of nets and invite them to provide the guidance and expertise.

NORTHERN PLACES

Admiralty Inlet
Back River
Banks Island
Barrow Strait
Bloody Falls
Bylot Island
Cape Hearne
Cape Herschel
Cape Perry
Cape Providence
Cape Farewell
Chesterfield Inlet
Contwoyto Lake
Cornwallis Lake
Countess of Warwick Sound
Davis Strait
Erebus Bay
Franklin Point
Frobisher's Strait
Fury Point
Gjoa Haven
Gladman Point
Hood River
Le Vescomte Point
McClure Strait
Mercy Bay
Parry Islands
Rae Strait
Starvation Cove
Sylvia Grinnel River
Terror Bay
Turnagain Point
Wager Inlet
Winter Harbour

FOR CHILDREN TO DO

Find out the traditional names of these places

Make a map showing the locations

Where did the names come from

In which places are people living today

Are there any old people who may remember stories that they heard about some of these places — use a tape recorder

Invent a picture story of things that might have happened at Mercy Bay or Turnagain Point —

Act out what might have taken place when ships first appeared at one of the places where people were living.

NORTHERN THINGS

The Drum - what is it, where does it come from?

Inuit Tapirisat - Who is involved, where is it located?

C.O.P.E. - What do the initials stand for, what is it, where is it located?

Tapwe - Where is this found, what is it?

Council of the N.W.T. - Who are the members, how many are elected how many are appointed, how often does it meet, where does it meet, what are its responsibilities;

N.C.P.C. - What is it, what does it do?

Indian Brotherhood - What are its purposes, where is its head office, who are some of the leaders, what newspaper does it put out, who may join?

C.B.C. Northern Service -

Where are the broadcast facilities located, what part of the North is served, what part is unserved?

News of the North - Where does it come from, how often is it available?

Transair, Nordair, Pacific Western, Gateway, Reindeer Air Service, Ptarmigan, Northward, Northwest Territorial, Atlas Aviation, Wheeler, are some of the airlines and carriers in the N.W.T. Where are they located and what areas do they cover. What types of planes do they fly?

Think of some more Northern things and have the pupils search out some details and ask some questions. (Where is Giant mine - what is C.O.M.I.N.C.O., what is N.T.C.L. and so on.

ORGANIZING THE SCHOOL DAY

TIME TABLES SOMETIMES LOOK LIKE THIS:

Opening Exercises
Language arts

Recess

Mathematics

Lunch

Storytime
Social Studies

Recess

Spelling
Art

OR EVEN LIKE THIS

Opening exercises
Reading
Spelling
Phonics

Recess

Writing
Storytime
"Free" reading

Lunch

Mathematics

Recess

Science
Art
Play

TIME TABLES LIKE THESE (OR EVEN MORE STRUCTURED) OFTEN OCCUR DAY IN DAY OUT OVER THE 10 MONTH SCHOOL YEAR - WITH BUT MINOR VARIATIONS (A LITTLE MUSIC, PHYSICAL EDUCATION, ARTS AND TECHNOLOGIES, ETC. THROWN-IN).

WHY NOT WORK TOWARD THIS ....

THE INTEGRATED DAY

In planning for the integrated school day there is no separation of activities or skills and no separate scheduling of any one activity other than the "fixed points". e.g. opening exercises, Physical education (assuming there is a gym schedule to follow), Music (assuming there is a music teacher and/or a music room), or other similar activities that involve a specific room and/or a specialist teacher. As a result, one might see all aspects of the program and learning environment in use at all times as for example: science experimentation, mathematics activities, reading, listening, painting, talking, playing...A group of children getting the teacher's or teaching assistant's special help and attention could be found at any time.

In the integrated day the teacher fosters the child's interests to the point that there is no need to "safeguard" particular subject like reading, writing and arithmetic by reserving special times for them since the children can be relied upon to choose them sufficiently and sometimes for longer periods than would have been allocated in a more structured, rigid time-table.

Moreover, the integrated day can extend itself over a longer period of time given the fact that children do become engrossed in something and wish to continue exploring it, at least for awhile.

THE IDEAL IS TO PROVIDE A LEARNING SITUATION THAT ALLOWS THE CHILD TO CUT ACROSS SUBJECT AREAS IN PURSUIT OF HIS INTERESTS. THE INTEGRATED DAY SUPPORTS THE CHILD'S INTEGRATION OF EXPERIENCE AND HELPS TO SUSTAIN HIS INVOLVEMENT.

How can the integrated day be achieved?

Probably it is best to start out on a gradual approach utilizing first of all a small block of time such as an hour. Once both teacher and students become accustomed to the freedom of this period consideration could then be given to extending the period for half a day. The prime consideration is to make it possible for children to learn in an unencumbered way as possible. Such an approach can be implemented throughout the grade levels and need not be confined to kindergarten through grade three only.

SIMPLE BLACK AND WHITE PHOTOGRAPHY

What does a six year old child see - using a simple camera?

Organize a photography team to gather pictures to go with the tapes collected by other pupils. Assign roles as for example a producer, a camera man, a script writer, a public relationsman, lay-out/design artist, editor, publisher.

Photograph designs found in nature -- a leaf, snowflakes, tree branches against a blue sky, clouds, sunsets, sunrise, animal tracks, ice formations, drifted snow, icicles erosion (water and wind), sun dogs, an approaching storm, raindrops, evergreen needles, flower petals.

Use a camera to learn about perspective -- a line of fence posts, a snowshoe trail, an airstrip, a road, row of houses, boats along a beach.

Examine man-made designs -- snowshoe tracks, snowmobile tread, types of footwear, dog sled runners, winter and summer tire treads, ski-wheels, cross-country skiis, a cat, a front end loader.

Photograph some things that convey a sense of warmth, of cold.

Photograph the beautiful in the environment - smoke curling out of the chimney on a frosty morning, a clear sky, sparkling water, signs of autumn, signs of spring, green grass (a colour film although expensive might be included from time to time) a tall tree, a willow bush.

Photograph the ugly -- oil drums scattered along the beach, man made problems like indestructable plastic products, pop cans, animal carcasses, rusting machinery and equipment; air pollution, the appearance of the settlement after the snow melts.

Photograph one another -- doing things, not doing things.

Take pictures of things that make loud sounds - soft sounds.

Make a collection of various forms of local transportation.

Photograph life "on the land".

Collect pictures of old people - young people - babies.

Tell a community story through the eye of a camera.

PHOTOGRAPHY PROGRAM

THINGS to get:

Simple to operate "Instamatic type" cameras at $20.00 each
Flash cubes - about $1.50 per package
Black and white film - $1.00 per roll

Darkroom materials

Paper - single weight bromide - 8x10 contrast glossy
    200 sheets - $20.00
    same as above only 5x7 $10.00
Photo Flo solution - one bottle at $2.00
Developer - Kodak Dektol - one gallon at $3.00
Developer - Kodak D-76 - one gallon at $3.00
Fixer - Kodak - one gallon at $2.00

(N.B. all costs are approximations)

PLANTS TO COLLECT AND STUDY

Lichens
Reindeer Moss
Iceland Moss
Rock Tripe
Hair Cap Moss
Carpet Moss
Horsetails
Ferns
Cotton Grass
Bog Rush
Woodrush
Sweet Grass
Foxtail
Bluegrass
Marsh Grass
Buckwheat
Mountain Sorrel
Knotweed
Eskimo Rhubarb
Chickweed
Sandwort
Marsh Marigold
Lapland Buttercup
Snow Buttercup
Arctic Poppy
Wall Flower
Arctic Cinqfoil
Crowberry
Leadwort
Chrysanthemum
Scurvy Grass
Yellow Mountain Saxifrage
Mountain Aven
Labrador Tea
Richardson's Phlox
Northern Wormweed
Tansy Mustard
Alpine Saxifrage
Milk Vetch
Arctic White Heather
Butterwort
Dandelion
Rock Cress
Liquorice Root
Primrose
Aster

CHILDREN CAN ...

Make a collection of local plants
Paint pictures of flowers
Find out which plants are edible
Learn the names for local plants in the local language
Take photographs of plants using a simple black and white camera
Learn how to dry flowers
Make decorations
Find out which plants can be used as dies
Look for pictures in books
Experiment in making a collage
Investigate the soil and moisture conditions in which various plants grow
Look at the parts of a flower - use a microscope
Learn about photosynthesis
Plant some seeds
Try an indoor garden using local materials

RECORD KEEPING

THE IMPORTANCE OF RECORDS

The teacher's intelligent observation of a child at work is essential if the teacher is to ascertain the level of the child's understanding and the process by which he arrived at his understanding, his style of work and his interests. For these reasons, anecdotal records, notes on possible starting points and on possible difficulties are considered to be the most important types of records.

Records on attainment are of secondary consideration. It is expected that teachers will keep records of the progression of a child's work - work cards completed, progress in reading, etc. However, it is more to the point to keep a separate account for each child of the progress of all work he has undertaken in which the motivating force is the child's own strong interests.

In record keeping of this type it can be anticipated that the accounts will cut across subject areas and focus on the child's thinking process. It is important to watch for and foster a child's growing ability to initiate, to sustain, to tell about and to make judgements about his work.

Children can be encouraged to keep records of their own, of where they are in their work and of what they have attempted; work itself - the books they make, the pictures taken, the pictures they have painted, graph work they have done - all provide clear records. File folders of such work indicate the growth and progression of the child and can be shared with the parents.

In the Northern context where teacher mobility is a fact of life it is absolutely critical that an attempt be made to develop and maintain the most comprehensive records possible. Any teacher who has walked into a teaching situation wherein no records have been maintained will recognize the validity of this remark.

WHAT TO INCLUDE

An individual record of each child background, mother tongue, personality, special interests, aptitudes and attainments.

A weekly comment (s) on the child's progress.

Samples of a child's work in all areas at a particular time.

Jotting of brief observations of a child's reaction to a situation.

Concepts in subject areas successfully undertaken.

Achievements in the skill subjects.

A tape recording of the child's oral language development.

Snapshots of projects completed....

ROCKS AND MINERALS FOR COLLECTING AND STUDY

BAFFIN ISLAND

Antimony
Asbestos
Coal
Cobalt
Columbite
Copper
Corderite
Fluorite
Garnet
Graphite
Gypsum
Iron
Lazurite
Magnetite
Marble
Mica
Native Sulphur
Nickel
Phosphorous
Platinum
Pyrite
Quartz
Serpentine
Silver
Soapstone
Tourmaline

MACKENZIE DISTRICT

Chromite
Copper
Cobalt
Garnet
Gold
Nickel
Gypsum
Pitchblende
Silver
Soapstone
Amethyst
Sulphur
Lead
Zinc

HIGH ARCTIC ISLANDS

Agate
Chalcedony
Copper
Jasper
Pentlandite
Sphalerite

KEEWATIN REGION

Amethyst
Arsenic
Chromite bearing minerals
Copper
Fluorite
Gold
Jasper
Molybdenite
Pitchblende
Platinum
Pyrite
Quartz
Silver

WESTERN ARCTIC ISLANDS

Copper
Pyrite
Serpentine

THINGS TO DO

Visit a mine site
Collect many samples
Locate on a map
Write to mining companies for information
Do some experiments with simple chemicals
Draw pictures showing variations
Discuss uses of each
Find out who owns the mineral rights
Relate these riches to land claims
Interview a prospector
Do some lapidary work
Examine ecological effects of mining
Explore differences between open-pit and deep shaft mining
Make a scale model of a mine

SEWING PROGRAM

Materials required for a class of 30

Duffle - ½ yard per pupil - plus a bit extra to compensate for "errors". about $10.00 per yard

Needles - ordinary embroidery 12 packets at 15¢ each
groove needles - 20 packets at 30¢ each

Yarn - 32 balls required at 60¢ each

Stroud ¼ yard per pupil - 8 yards required at $10.00 each

One inch wide braid - 30 yards required at 75¢ per yard

Thread (standard) - 5 spools of black +10 at 90¢ each
5 spools of white +10 at 90¢ each

Cotton material - heavy, coloured - 3 yards at $4.00 each

Sealskin work (or local substitutes) 5 skins at $25.00 each

Embroidery work - 12 boxes of thread at $4.00 per box

Odds and ends (some extra items that may be needed) - $25.00

(N.B. all costs are approximations)

Local Involvement

Make arrangements for resource people to be involved with the program to teach the students various skills. Contracts, casual employment and/or volunteer arrangements can be worked out.

SHELLFISH TO COLLECT AND STUDY

Clams
Thin Nut Shell
Arctic Yoldia
Iceland Scallop
Blue Mussel
Stimson's Surf Clam
Wrinkled Musculus
Black Musculus
Fragile Spoon Shell
Large Pandora
Black Clam
Long - Neck Clam
Northern Heart Shell
Icland Cockle
Greenland Cockle
Venus Shell
Chalky Macoma

CHILDREN CAN ...

Collect local samples
Find out if there are names for the shellfish in the local language
What shellfish are edible
Are shellfish a part of the traditional diet
Examine the shell designs
Find out how shellfish eat
Investigate the relationship between shellfish and the walrus
Look at fragments of shell under a microscope
Make some decorations
Paint the shells
Determine the age of the shell
Find fosselized samples of shellfish

FAMOUS SHIPS

Alert
Alexander
Assistance
Churchill
Discovery
Enterprise
Erebus
Fury
Gabriel
Gjoa
Gripper
Hecla
H.M.C.S. Labrador
Intrepid
Investigator
Isabella
John A. Macdonald
Manhatten
Mary Sachs
Michael
Moon
Neptune
North Star
Pioneer
Porpoise
Resolute
Seahorse
Terror
Thomas Allen
Trent
Unicorn
Vestal
Victory
Wrigley

CHILDREN CAN ...

Draw some pictures of boats
Make some simple models
Trace on a map the ship routes
Find on a map places named after the ships
Think-up a list of provisions needed for long voyages
Make a relief map of the Northwest Passage
Compare the size of the Manhatten with the Unicorn
Use a tape recorder to tell an imaginary story about life on the Gjoa
See what you can find in books about these ships and others
Why might someone name a ship "Terror", "Fury", "Pioneer".

SNAILS TO COLLECT AND STUDY

Tortoise shell limpet
Cup-and-Saucer
Northern Rosy to Shell
Wavy Top Shell
Ladder Shell
Iceland Moon-Shell
American Pelican Foot
Rock Purple
Needle Shell
Arctica Natica
Common Velvet Shell
Cap Shell
Orb Shell
Common Periwinkle
Smooth Periwinkle
Atlantic Dogwinkle
Common Northern Neptune
Brown's Barrel-Bubble

CHILDREN CAN ...

Collect local samples
Keep some snails in a jar in the classroom and watch their activities
Find out how a snail moves
Think of common expressions that describe the snail's mobility
Place a snail shell to the ear and listen
Measure the circumferance of the shell
Draw a picture of a snail's "house"
What do snails eat
Who eats snails
Decorate some shells

THE TEACHING TEAM

WHO MAKES-UP THE TEAM

One or more teachers
One or more teaching assistants
One or more community resource people

WHAT'S ITS PURPOSE

To draw upon the strengths and resources of many people
To utilize these resources in the classroom

WHO CAN DO WHAT

The teacher provides the professional know-how, the expertise, the overall guidance in terms of defining the aims and objectives of a particular program. In a multiple teacher situation as in an open area classroom setting, individual teachers may have particular strengths and interests in specific subject areas. The "team" approach can accomodate these factors.

The teaching assistant provides the bi-lingual capability. He/she can interpret the "concepts" into the language the children understand to the best advantage. Furthermore, the teaching assistant can ascertain the learning difficulties of the child which may go unnoticed in an unilingual situation. The teaching assistant can provide a valuable link with the community. Contacts with possible resource people can be forthcoming in this fashion.

HOW DO WE GET STARTED

By commencing with joint planning involving the teacher (s) and teaching assistant (s). A decision has to be made as to the broad outline of the program you are about to embark upon. For example, are you going to employ the local language in the instructional setting all of the time, some of the time, or not at all. Depending upon your answer, what is the role of the teaching assistant to be in this respect? Are you going to try an integrated school day or will you have a highly structured day? What about small groups - will the teacher work with one group while the assistant works with another? What type of activities can be developed utilizing local resources - people and the physical environment? What type of learning materials have you to work with and which ones do you intend to employ? Take some time to familiarize your assistant with everything that you have available. Are you going to set up various interest centres within your classroom? How much time can be devoted on a daily - weekly basis to joint planning involving all team members.

Continuous co-operative planning on a regular basis is a must. Given the fact that personality differences are bound to crop up the team members should attempt to work their program on a gradual, developmental basis rather than jumping-in with "both feet".

WHAT PROBLEMS CAN BE ANTICIPATED

Likely the time factor for planning is as worrisome as any. This issue cannot be sidestepped. Assuming that you are in a settlement where the child's mother tongue is the language of common usage it is going to take a lot of effort on the part of all team members to make a bi-lingual classroom a reality. It should be noted that TIME is not your enemy in one significant aspect, at least. Don't be in a rush to get at the books or to get started on the 3R's, for that matter. Your initial primary concern should be in fostering "communication" and in a bi-lingual classroom that means developing a program where instruction takes place in the mother tongue of the children. The learning experiences for a given day or week have to be discussed with the teaching assistant so that she, in turn, can make these intelligible to the child While this is going on in the classroom the teacher can be working with the English speaking children, as appropriate. All of this takes time but it might help to realize that the primary years are crucial, they constitute the foundation of the child's education and the cornerstone of the foundation is the child's facility in his language.

Besides the time factor, it has to be realized that personality conflicts among and between team members can be fact of life. It is easier in many ways for one person to try and do the whole job by himself. Frankly, a cross cultural classroom needs the team approach. Language and cultural considerations dictate the necessity of combining a variety of talents in the learning environment.

IS IT ALL WORTH IT?

Yes (ANY OTHER COMMENTS WOULD BE SUPERFLUOUS)

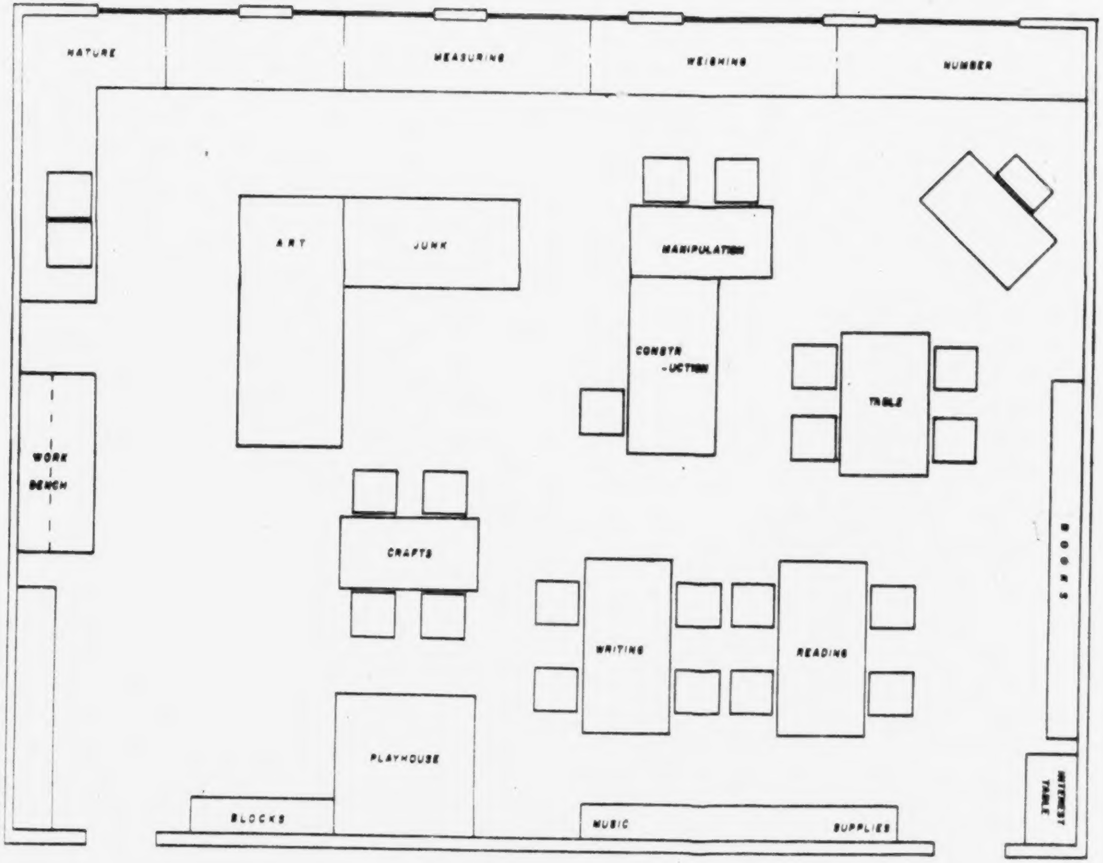
USING WHAT IS AVAILABLE

A "NORTHERN" WHOLE EARTH CATALOGUE

Iron Pyrite - used for fire starter
Cotton Grass - Combined with fat to make lamp wicks
Soapstone - used to make lamps, pots, ladles
Arctic Willow - provides tinder for fires
Ptarmigan Bones - provides material for needles
Caribou Sinew - provides material for thread
Walrus Hide - used for harpoon lines and dog harnesses
Driftwood - used for making sleds
Wolverine Fur - used for trim on parka hoods
Ringed Seals - provides basic food and fat source
Black Guillemot - a source for eggs and food
Narwhal - source of vitamin C (the outer skin - muktuk); tusk used for harpoon shaft
Musk-Ox - hides used as sleeping platform cover; horn used for cups and ladles
Arctic Hare - source of food; fur used for blankets and socks
Polar Bear - all parts of the bear can be used except the liver which contains too much vitamin A
Caribou - supplied food; skins for clothing; antler and bones for weapons and implements; sinew for thread
Ground Squirrels - provided alternative source food in times of starvation
Arctic Char - a prime source of food
Arctic Fox - a valuable source of income for the trapper
Ermine - a valuable source of income for the trapper
Boulders and Rocks - used to construct Inukshuks - to assist in hunting

CHILDREN CAN ...

Extend the catalogue in terms of the local community
Talk to adults and get their ideas - use a tape recorder
Make a survival manual
Illustrate a picture book of the various things


NATURE
MEASURING
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NUMBER
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MANIPULATION
CONSTR-UCTION
TABLE
WORK BENCH
CRAFTS
WRITING
READING
BOOKS
INTEREST TABLE
PLAYHOUSE
BLOCKS
MUSIC
SUPPLIES

A LEARNING ENVIRONMENT
SUGGESTED LAYOUT